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Last week we gave to our readers the sorrowful news that Mr. Charles Edwin Sanderson, whose name and fame for quite on to two-score years were as household words to the gas industry, had succumbed to his long struggle with disease, the fatal ending being reached the afternoon of February 20th. Deceased, who was the son of Edwin Sanderson and Sarah P. Munn, was born in Williamstown, Mass., April 27th, 1846, received his early education in the preparatory school for Williams College, that was well over a half century ago, maintained in Williamstown by a widely-known pedagogue named "Bennie" Mills. His mother died when he was very young, and lacking the steadying which comes from the maternal direction, he preferred when still only a lad to forego the training that goes with a course in college. He eventually prevailed upon his father, who early in the sixties was engaged in business in New York, to permit him to come to this city and go forthwith to work. Arriving here in 1865 he obtained employment with a large kid glove importing house, remaining with it until the death of one of the partners caused the closing out of its trading. Shortly thereafter (in January, 1870), he was employed on the office force of the AMERICAN GAS LIGHT JOURNAL, and not long after the death of its proprietor (Mr. Mills L. Callender, who passed away, February 21, 1871) he was appointed Manager of the JOURNAL, which position he maintained until the end. That his long stewardship was a faithful and successful one needs no recounting here, for such on both accounts it is personally known to 80 per cent. of the gas men in America, and fairly so abroad as well. There is not much to say of him here that is not in the minds of the vast majority of our readers. Alert, positive, courageous, resourceful, it was also in him to be cautious and considerate. The writer (who was closely associated with him in business and in the most social way since May, 1870), can and does truthfully say of the subject of this sketch that he never knew a man who had a greater sense of honor or of honesty. His business life was in reality the history of the JOURNAL, his knowledge of the gas industry was far reaching, his influence on it in the olden days was much and ever for its best advancement. How could it be otherwise when it was remembered that his associates in closest business were Mills Landon Callender, George Warren Dresser, Joseph Russell Thomas. Could one go wrong with such preceptors as instructors; with such men as counsellors and intimates? What more can be said? Not a sound. As his business life was, so was his home life. Everything therein and thereof was unified and quiet and harmonious. He was united in marriage, May 18, 1882, to Miss Ella G. Romaine, of this city, who survives him, as does a daughter, Miss Florence C. Sanderson.

Never very rugged or robust in health, in September, 1900, while seated at his desk in the JOURNAL office, he was stricken with paralysis, and although his connection with the JOURNAL was fairly active up to the late summer of 1906—in fact, he attended the last meeting of the Western Gas Association in that year—he gradually failed until the end came, as stated above, peacefully and in the midst of those nearest and dearest to him. The funeral services, conducted by the Rev. Hugh Carson, were held in his late home, 239 McDonough street, Brooklyn, the afternoon of the anniversary of the birth of Washington. The service was as he would have it, plain and unassuming, and present thereat were many with whom he had labored. Amongst the many floral tokens was a handsome memento from the New England Association of Gas Engineers, which assemblage had just closed its 37th annual session. In this connection it is noteworthy to recall that Mr. Sanderson had been an attendant at these annual reunions from the first time that other than New Englanders were invited to share therein (1872, we think), consecutively. That he was of them indeed is eloquently and lovingly shown through their beautiful action last month concerning his memory, in the convention hall, in the banquet room and at his bier. Gone from life he is, but time will blot hard and long ere his record fades from the pages upon which the history of his useful, honorable connection with our industry and profession is written.

LIBRARY OF CONGRESS MAR 4 1907 SMITHSONIAN DEPOSIT

BRIEFLY TOLD.

GAS AERONAUTICS.—The "America," the largest racing balloon ever seen in the United States, with a capacity of, approximately, 2,250 cubic meters, or 83,000 cubic feet of gas, built in Paris, France, by Monsieur Maurice Mallet, for Mr. J. C. McCoy, a wealthy New Yorker, was given a successful flight at 1:10 P.M., Saturday, February 23d, from the East Station works of the Washington Gas Light Company, 12th and M streets, S. E., Washington, D. C. The ascension was made under the auspices of the Aero Club of America, in conjunction with the Signal Corps of the Army represented by Capt. Chas. De F. Chandler. Mr. McCoy, who has made numerous ascensions in this as well as foreign countries, and who holds an aeronautic pilot's license from the French Government, was in command of the balloon and was accompanied in his successful flight by Messrs. Allyn R. Hawley, Augustus Post and Leo Stevens, all enthusiastic and successful aeronauts. Gas for the purpose was supplied in the following manner: A 6-inch gas main was connected from a coal gas station meter to the inlet of a special holder, from which it was taken by a McKenzie exhauster, erected outside the meter building, and conveyed, under a pressure of 12 inches, 750 feet to the balloon, which was anchored on a hill top, the elevation being about 25 feet above the exhauster. The gravity of the gas supplied was .426. The filling started at 10:35 A.M. and was completed by 12:25 P.M. The actual time of filling, exclusive of stops, was 1 hour and 35 minutes, which is the time record for this kind of work, 83,000 feet of gas being used. The gas arrangements were made under the personal supervision of Engineers Jas. S. McIlhenny and Thos. F. Holden and Manager Wm. F. Hart, of the Company. The members of the Aero Club and the Signal Corps who were present expressed themselves as more than pleased with the results and the Gas Company has been requested to make the connections permanent, for it is the intention of the Army to conduct a number of balloon tests in the near future. In this connection I am advised it is the intention of the Signal Corps to build a few gas plants in various sections of the country for this and other aeronautic experiments. Plans are already out for a plant at Fort Omaha, Neb.—T. J. F.

A CORRECTION.—In our editorial correspondence in last week's issue respecting the election of officers for this twelvemonth to govern the New England Association of Gas Engineers, the Vice-Presidents, as to the order of succession was mis-stated, Mr. W. G. Africa is First Vice-President; Mr. J. E. Nute is Second Vice-President.

PERSONAL.—Mr. R. M. Kellogg has resigned the place of Superintendent of the Yonkers District of the Westchester (N. Y.) Lighting Company to accept the post of Superintendent to the Lowell (Mass.) Gas Light Company, vice the late Mr. A. C. Pease.

RECENT INCLOSURES.—We acknowledge our indebtedness on general recent account in this respect as follows: From the General Gas Light Company, of Kalamazoo, Mich., an excellent pair of photographs, taken by the aid of the Humphrey arc lamp light, one evening, of two London market stalls, the first devoted to the sale of vegetables, the other to the display of meats, in London, England. The photographs are so perfect that every detail of the display can be easily taken by the eye. For instance, in the photo of the butcher shop the name of the shop is the London Suburban Meat Store, and the safe in the corner is marked "Cash Butcher." The cut up joints are plainly recognizable, in fact one can name from the visual inspection the sorts of meat that are shown. The vegetable stall, which is operated by one Frank Smith, and its contents, are as easily distinguishable as are those in the meat shop. Write to the General Gas Light Company for a set.—The inclosure of the Jeffrey Manufacturing Co., of Columbus, O., is a circular pamphlet description of its latest improved types of machinery for handling coal and ashes, the illustrated story respecting which is well-told.—Another handsome folder pamphlet announces that the Michigan Stove Company has "Risen from its ashes." Our readers will perhaps remember that a large section of the Company's plant was destroyed by fire the 9th of last January, but pluck and work restored the plant so speedily that on the 12th of that month they "took off a 60-ton heat in the foundry, and began mounting stoves." It is well that such action should be retold to the fraternity in the shape of a court message.—Another handsome photograph comes to us through the courtesy of the Milwaukee Gas Light Company. It is labeled "Grand Avenue's Bright Spot," and it is a reproduction of street illumination at night on the sidewalk—front of the show windows of the "Phillip Cross Hardware Company." By-the-way the illumination is also traceable to the Humphrey gas arc.

Address of the President (Mr. William McGregor, Pawtucket, R. I.) on the Occasion of the Thirty-seventh Meeting, New England Association.

Gentlemen of the Association—The very agreeable task (if so considered) bequeathed from one generation of presidents to another has fallen to my lot, and in order to be in harmony and accord with the weighty and memorable traditions of the past, which seemingly "Time does not wither or custom stale," I herewith submit the president's annual address. But before I touch on matters of the profession, let the happy privilege be mine of congratulating the members of this, the oldest Gas Association in America, that they are about to celebrate the 37th anniversary, full of confidence and enthusiasm, imbued with an inflexible determination to still further "lengthen their cords and strengthen their stakes," and most conscientiously resolved that, though other systems of lighting may rise and fall, yet gas shall endure and prevail.

That you are justified in your attitude and point of view few will deny. In this very practical and commercial age we cannot afford to be unduly optimistic unless the material facts in the case thoroughly warrant and justify it; but after a careful and analytical study of the industry as it is, of the record of accomplishment, of the promises of the future, I can see *no* reason for pessimism—*every* reason for cheerful and serene optimism.

The wave of prosperity that has in such an astonishing—if not unprecedented—manner swept across this country has not passed us by. On the contrary, we have enjoyed our full share of success and good fortune. Advance sheets indicate a general increase in output and sales all along the line; which goes to demonstrate that the wheels of the industry are well oiled and the managers fully abreast of the times. Five years ago gas sold was 9,286,700,000, now 13,021,200,000 cubic feet. The decrease in the price of gas averages 8.4 per cent.; increase in meters 44 per cent., and gas sold 40 per cent. Although these figures are hard to grasp, yet a cursory consideration of them impresses you with the fact that the gas industry is constantly growing and expanding. Electricity is further away than ever from proving to be the "death knell," as was prophesied and expected. It has proven to be to us a blessing in disguise. The lethargy, so characteristic of former managements when monopoly prevailed and competition in lighting were practically unknown, is a thing of the dead past. Competition has been a stimulus and inspiration, so that where stagnation and failure were to prevail, we find aggression, expansion and prosperity. All over the world it is being fully demonstrated that, where convenience, cost and certainty are considered, the public receive the best all-round satisfaction from gas—not only for lighting, but also for heating and power. It is all very well for our electrical friends to descant on the apparent advantages of electricity—absence of odors and heat, lessened fire risks, simplicity of application—but after all is said and done it is very much as the distinguished Sir William H. Preece recently declared: "And lo! The gas people are quietly gathering in the money while the electricians are condemned to go on trying to sell the same old wares; a lamp (referring to Edison's carbon filament one) which is worse rather than better after 25 years, is poor stock-in-trade." In the light of such observation it is easy to understand why gas companies find their product in greater demand than ever, and why hundreds of consumers, after trying out electricity, have come back to using gas.

Our statistics show that everywhere the price of gas is constantly being lowered, sometimes voluntarily, sometimes by moral or legal compulsion, sometimes through the working of the scientific "sliding scale;" and this, too, when the price of about everything entering into the manufacture, production and distribution of gas is on a constant rising scale—labor, coal, iron, etc. This imposes increased responsibilities, obligations and anxieties on the gas man. Now he is compelled, as never before, to judicious economizing all along the line, to paying vigilant attention to every detail of manufacture, construction and administration, and to making full, proper and wise use of improved or new processes, and in adopting and installing many of the modern labor-saving devices—such as charging and drawing machines, coke and coal conveyors, coal and trench diggers.

But this lowering rate for gas, with advancing price for commodities entering into its manufacture, is not the only source of care and anxiety; the socialistic tendency of the age must be taken into consideration and allowed for. It manifests itself in various and obvious ways. We find it largely responsible for the municipal ownership propaganda; we see its outcropping in "unnecessary and unfair legislation," in "inequitable taxation" suggestions, in its "encouragement of unwarranted competition in the face of existing reasonable service," in the restless-

ness and irresponsibility of many of our employees. Of course, we take it as "all in the day's work," go on serving the public early and late to the best of our ability, and do our utmost to postpone the day when it will become rampant in the land.

But you, experienced and skilful gas men, do not need to be told that of all projects fundamentally unadapted to the peculiar customs and institutions of this country, municipal ownership is the best exponent. When you can have changed the State and municipal atmospheres of this land, when you can have eliminated all taint of politics or political expediency from those in public office; when you can have the average citizen as scrupulous in spending or in advocating the spending of the money in the public treasury as he is of the money in his own purse; when partisanship in local affairs is dead and worth and capacity count for more than inflence or pull; then, and then only, will municipal ownership have a chance to succeed. If thoroughly capable and efficient men, who have made the gas industry their life work, are growing prematurely old through their efforts to profitably and successfully manage their business—and this, too, despite their adopting all up-to-date commercial methods and taking advantage of improved efficiencies and economies in operating—how easy is it to foresee the outcome of politicians taking charge, of the "wide-open" policy of expense installed, of experts giving place to theorists, amateurs or camp followers. But "man never is always to be blest."

What we may say will be regarded as *ex parte;* but when the proponents of municipal ownership get through their study of the fictitious records of success of municipal ownership in Great Britain—conservative, peculiar, abnormal old England—and have their way in experimenting on a large scale with it here in these United States, I shall be more than surprised if they do not find a fierce and implacable Nemesis lurking in every one of their undertakings; and the public as a whole must pay for it.

As to the question of "unfair legislation," the following extract speaks for itself: "The dissentient minority, on the other hand, held that it is an alarming proposition that a legislative body can, simply by its own fiat, arbitrarily fix the price at which the owner of a product must sell it, and equally so that the court must coerce him into doing so pending a competent decision as to the validity of the legislative act." If a respectable minority of the Supreme Court of an adjoining State so regards the legislation referred to, it would be superflous on my part to attempt to re-echo the opinions of the profession regarding it; there is only one way of looking at it.

That we ourselves are measurably responsible for the ills that afflict us, and those that threaten us, few can deny. The days of high rates, large dividends and indifferent service have left their sting; the public have had the facts ground into them; and now we suffer vicariously. Others of bygone days sowed the wind, and we are due to reap the whirlwind.

Under the circumstances there is but one sensible thing to do—re-educate the public. This can be done in part through publicity—one of the strongest safeguards of any public service corporation. A general system of uniform accounting should be in universal use; even then, it being a human institution, it cannot, in the very nature of things, be altogether accurate or satisfactory. As men, definitions, and circumstances differ so will reports differ; the personal equation which enters so largely into it is a variable quantity, and this almost precludes general agreement and uniformity. But even so, if it is simple, yet comprehensive, the public can use it in comparing results obtained in various cities and be able to clearly arrive at conclusions as to what they get compares with what is furnished to others. Financial reports should be published regularly in the local papers, showing the results attained, the cost—the accurate cost of service—the way it differs from the nominal cost of gas in the holder, and other illuminating and material statistics. The people should be encouraged to study such reports. Let them see that they are getting a "square deal." They may not appreciate it, but they will be aware of it, and that is something.

For several years past the daily question with most of us has been: "What shall we do with our tar?" Very recently we had the pleasure of entertaining, here in Boston, Sir William H. Perkin, the eminent discoverer of the coal tar color, and the patron of the drug industry that has arisen therefrom. Much as this country and Great Britain delighted to do him honor on the 50th anniversary of his discovery, much as his fame is secured for all time, yet after all what has it profited us or Great Britain? Our tar industry has not been affected for the better; the price we obtain is as low as even those who buy it could hope for. The same condition exists in Great Britain; but Germany has secured all the benefits, and last year her business in tar netted her over $100,000,000. But all doors are not closed to us. The developments of the past year have shown us one wide open—all we have to do is to enter. I refer, of course, to the use of tar in our highways for the suppression of dust and mud. This is no theory; in everyday use in France and Great Britain, it has made good; in some parts of this country it has also been successfully tried. It prolongs considerably the life of the roads, binding the surface, resisting the disintegrating tendency so much now in evidence as a result of the vacuum pressure and disturbance caused by the rapidly propelled automobiles. It is waterproof, improves the appearance of the roads, costs less than the oils and other preparations usually tried, or even than the ordinary sprinkling of water; one or two applications a year to the road are all that is required. In looking over the official reports of the results achieved I find practical unanimity as to its success; but there is much diversity in the way the tar is prepared and applied. Some take the tar just as it comes from the well, put it in an ordinary watering cart with special sprinkler, and report it effective for the suppression of the dust nuisance and no annoyance from the characteristic odors. Others extract the water from it, boil it, apply it by brushes, rubbing it well into the surface of the road; these are the strongest advocates, and the most numerous. Others, again, boil it, heat broken granite, limestone, or slag—preferably the last—mix them, and then use it as a sort of macadam; these are also enthusiastic as to the results. It must be confessed, then, that it is up to us to convince those in charge of our highways and those "higher up" that it will pay them to look into this matter, to test it and to adopt it. If the tar application will eliminate the dust nuisance, it will mean much to those who use the highways, much to those who live along them, much to us who have the tar for sale. It will also solve a vexatious, baffling and expensive problem for the highway department and at the same time be the means of our obtaining a satisfactory price for one of our chief by-products. It looks as if our tar troubles were ended; yet I do long to see the day when there will be less "going it alone" and more co-operating among the companies. What a simple matter it is, theoretically at least, to arrange for a common plant, for the use of companies occupying contiguous territory, for the proper treatment of their residuals.

As the price of gas goes down the need relatively increases for higher prices for the by-products. Many of the smaller companies might not be justified in going to the expense of installing the necessary stills, kilns or other apparatus; but if a convenient extracting plant were built—preferably at tidewater—by several of the companies acting as a unit, and full use were made of modern devices in obtaining those things of infinite value and importance from the by-products, what a good thing it would be all round? What a help it would be towards keeping down the cost sheets? It goes for the saying that "gas managers should be willing and anxious to go to any trouble in order to work their residuals up into as many salable commodities as their circumstances and surroundings will admit." Something has to be done with them. They are valuable, and the need is great, too, for turning them into as much cash as possible. What matters it if our gas works do assume the appearance of a chemical engineering works? The thing is, does it pay? Can we not make better use of the ammoniacal liquor? Sulphate of ammonia is a valuable fertilizer and can be readily extracted in large and profitable amounts; a tar distilling plant is a necessity for the simple, yet effective, treatment of the gas works tar. This will add to the ease of selling it and advance its price somewhat. From this also should be obtained the oil used by manufacturers of carbolic acid; also the creosote oil and its salts. The spent oxide of our purifying boxes should be made to render up its valuable sulphuric acid, or by a Claus kiln its sulphur. The cyanides, now so necessary for treating low grade gold ore, is another of the by-products that should be recovered. It is a most impressive assertion of fact that many of the gas manufacturers of Great Britain are making use of some or all of these means to reduce their net manufacturing costs, and so well are they doing it that for the last 10 years their coal and oil bills have more than been met by the net cash received from their by-products. There is no good or adequate reason why we too should not follow suit.

Other problems we must solve are: Is it possible to get the public so educated that it will accept a low grade, unenriched gas, if we supply free the incandescent mantles? With uniformity of pressure and quality there can be little doubt that this would prove a wise thing all round.

Another problem that will have to be attended to one of these days is as to how we can arrange for Sunday stoppage of carbonization. I believe that this will be insisted on sooner or later, and the sooner we get

to work upon it the better. Belgium has passed a "Sunday rest day," France has followed suit, and a bill is now in the British Parliament compelling the provision of a rest day in seven—preferably Sunday—in all forms of service save domestic. We will have to keep step with the times.

The vertical retort question is still an open one and one of absorbing interest. Reports from Dessau, Mariendorf, Cologne, continue to wax exultant over results attained, and detailed accounts tend to show that they have come to stay.

And now, in closing, let me say a few words in behalf of the Association and these meetings. If ever there was a time when gas men should work together it is now. The three Associations that have federated into the Gas Institute the past summer have realized this most acutely; they believe that in union there will be strength, progress and power. The tendency of the times is consolidation and concentration of effort. We here in New England stand for-and-by our own Association. It is the parent of them all and possesses all the potentialities for great usefulness. But we must make the best of our opportunities; we must have every Company in New England represented in our membership; we must develop enthusiasm, so as to increase in numbers and influence. The questions that come before us are the live and vital ones of the profession. Each responsible individual who gets his daily bread by this industry has an immediate and personal interest in the furthering of gas interests.

In order to have these meetings rich in results it is absolutely necessary that the papers read and the discussions following them should be productive of immediate and practical benefit. The members can make of them what they want. If those in charge of the smaller plants would only make the most of their opportunities and regard their works as "research laboratories," what a transformation might occur? If they record their daily experiences, the expedients they are forced to, the complications that have arisen and the way they were solved, the tests made, the experiments tried, the failures, the successes, the improvements, the methods devised, etc., and come here and give us the benefit of their experiences, and secure commendation or the inevitable criticism and advice. The larger plants do not admit of this; the smaller ones alone make it possible. And instead of those in charge of such modestly waiting for light from others they should let their own light shine and so help on the cause so near our hearts and make of these meetings something worth while.

Since our last meeting the following members have crossed the "Great Divide:"

C. F. Thompson, Brattleboro, Vt.; May 11, 1906.
Fred. W. Thomas, Boston, Mass.; June 21, 1906.
J. H. Armington, Providence, R. I.; October 14, 1906.
F. P. Fairbanks, Holyoke, Mass.; December 25, 1906.
A. C. Pease, Lowell, Mass.; January 3, 1907.
H. A. Allyn, Cambridge, Mass.; January 20, 1907.

Some of them, as you know, had arrived at the allotted span of man, had endured the heat and burden of the day, had lived lives of rich and honorable achievement, and their destiny had been fulfilled; but others, in the full flush of early manhood, brilliant, accomplished, eminent and strong, have had to lay down work upon which they were just starting, and leave in evidence but the earnest of what they would have accomplished. All of them had those lovable qualities so admirable in man; a high standing in the profession; characters flawless and enviable; and a loyalty and devotion to duty that is deserving of our emulation. We honored and respected them living; their memory is of precious savor; they rest from their labors, but our hearts do follow them.

Salesmanship.

[A paper read by Mr. J. D. Kenyon, of Chicago, at the last meeting of the National Commercial Gas Association.]

Gentlemen: This convention is a tribute to science. Science turns round the wheels of commerce. Science has invented all the machinery that moves the car of commerce. Science has entered into all the departments of production and has enabled this nation to be the commercial nation of the world. Science has replaced the ox-cart with steam and electricity. Science has replaced the mounted messenger by the instantaneous telegraph and telephone. Science has supplanted the tallow candle with gas and electricity. Science has brought around such a perfect condition of affairs in the producing part of the commercial world that there is no longer much of a question on the manufacture of goods in quality, quantity and price.

The great problem is the distribution of these goods to keep up with the production on a basis of growing and profitable trade. And now the business world is bringing the light of science into the distribution end of its work all over the world. In our own country especially there is a wonderful awakening in this direction, and this convention is only another evidence of the fact.

Your programme indicates that your main difficulties are not with the production end of your business but with the selling end. The more this subject is studied the more it will be realized that it is simply a question of efficient organization. In its essence it is really a question of salesmanship.

Let us pause for a moment to consider who the salesmen of the world are. In a broad sense, every commercial institution is a salesman and every person connected with it, from the president to the office boy, is a part of the composite salesman.

The word salesman is generally applied only to the man out on the firing line, but the sale is not comprised in the taking of the order, for everybody who has anything to do with the transaction of business up to the time when money is actually received, has contributed his part to that sale, and, therefore, is a part of the composite salesman, the institution itself. Hence the necessity for efficiency does not rest alone with the man who is on the firing line, but with the entire organization, that it shall be a smoothly running piece of machinery.

Of late years much thought and attention have been given to this subject on the part of many concerns. Various attempts have been made to improve the conditions. Every employer is constantly on the lookout for good men, but good men are scarce. Good men already have jobs. Therefore it is evident that the employer cannot simply wait until a good man shows up. The next best thing to do, therefore, if not the best entirely, is to develop good men; and this is purely a question of education.

Unhappily, our educational system has been such that young men starting out in the business world are not equipped with the right kind of training for successful action, and, therefore, it devolves on the proprietor to see that he gets it. That being admitted, it is simply a problem of method. Various methods have been tried with varying success, but as a rule not satisfactory. Some proprietors have instituted occasional lectures, others have worked on the method of using periodical letters or bulletins, some have even organized special schools of training on the details of the selling points.

You can fill the employee full of technical details, but after all if the man is not right himself it avails but little. If he is not a man who is constantly seeking a development of his natural forces and the widening and application of his knowledge, you cannot and do not get the best results.

Any system of education that will be a success, therefore, must embrace two cardinal features: First, training on the vital problem of man building; second, the development of the study habit. The effectiveness of an individual is the sum total of the growth of his mental and physical forces plus his knowledge of the business and how to apply this knowledge most directly.

True education consists of the dual process of the symmetrical education or drawing out of the natural mental and physical forces, and of the instruction in useful knowledge—with emphasis on the useful. And this process requires study, and, therefore, the habit of study must be formed and carried out through life if true progress is expected.

We either go forward or backward; we are either better business men to-morrow or poorer. And to be better business men requires work, energy, study. Hence the necessity for instituting an educational department in every well regulated institution, a fact which the commercial world has latterly come to recognize. Indeed it is rapidly realizing that it is even more urgent to expend money in the direction of the developing of efficiency through educational channels (thereby adding to the assets of the company) than to spend it in improvements at the production end of business.

No pain or money has been spared in installing machinery, system and methods which will increase the production or lessen the cost. And it is strange that the business world has not sooner realized that the expenditure of money in the training of the machinery of the bodies and minds of their employees is even more valuable.

Now, why is this necessary? The basic law of all true business relations is the law of confidence. This confidence consists of belief in the institution (the composite salesman) and in the product the institution sells.

As stated before, the production end of business is in such a condition that confidence in the use of gas, for instance, is well established. You have spared no pains or money to bring that up to a state of perfection. Well, the next step is to see that such improvement is made in the personality of the institution that confidence is inspired and maintained there also.

This gets right down to the question of the individual, the man who comes in direct touch with the public, who has the ability to inspire or destroy confidence. Once the salesman secures the confidence of his customer, the battle of success is half won.

On what, then, does confidence rest? Is it not his personality? By that I do not mean simply good looks and good clothes, but the personality is the outward reflection of the true man within. In other words, it is the evidence of his character and of his health. Institutions have a personality as well as individuals, but it is the composite result of the personality of each individual connected with them. Institutions have character and health made up of the composite character and health of each individual.

Character and health are not simply natural born qualities, but are developed qualities, and the greatest developing agency in the world today is education—true education—which consists of both the educative and the in-filling processes.

Again, the value of the employee depends upon the amount of supervision that he requires. If he doesn't need any looking after his value is at the highest. He has genuine initiative, a very rare quality these days.

Supervision is occasioned by the errors of the employee—errors of omission plus errors of commission. If the employee did everything that he should do and if all he does were done correctly, he would make no errors, he would require no supervision, and his value would be at the maximum point.

Now, the problem is: What occasions these errors? And on analysis, we find they are due to negative conditions, both physical and mental.

Now, know throughout all nature there is a duality of positives and negatives and the same duality runs through our physical and mental faculties and qualities. If we want to eliminate the negative of darkness we turn on the light; if we want to eliminate the negative, cold, we turn on the heat; and if we want to eliminate the negative, menial or physical conditions, we turn on the positives.

To illustrate: A man possessing the physical negatives of weakness, laziness and awkwardness, reflects a personarity that is anything but pleasant, and, in fact is ugly. If he builds up the positives of strength, activity and symmetry, his personality is physically attractive. But from a commercial standpoint it also represents one of the greatest assets ever held by man, namely, Endurance.

A man must have the ability not only to get into the game, but to stay in the game. Business life to-day is an intense one. It is not a playground; it is a battleground where only the fittest survive. A man must have ability to move quickly and directly. This is not the age of oxen, but of electricity. He must be ceaseless in his energy; he must be symmetrically developed, for his human frame is a piece of machinery and no piece of machinery is any stronger than its weakest part.

We know that every normal man has the same set of muscles and nerves, but they are differently developed in each individual. We also know that the right kind of physical exercises and of breathing and of eating and of thinking will develop these muscles, will perfect the body so that he has health and possesses the endurance necessary to the real battle for success.

Too little attention has been paid to this on the part of proprietors today. It has been stated that 50 per cent. of lack of results is traceable to the lack of proper attention to this question of health. If commercial institutions went no further than to see to it that each employee is busy with developing this great asset, health, it would have a wonderful effect upon business.

A man possessing good, strong, rugged health is conscious of a power that impels him on to do things. It has likewise much to do with the pleasing personality of the individual. It is the generator of optimism.

Let us look for a moment, now, at some of the mental faculties.

First, perception. The negative of perception is dullness. One who has not the ability to perceive things, has not good faculties of observation, can have but very few ideas. In fact, every idea that comes to us comes through one or another of the five physical channels of seeing, hearing, touching, tasting, smelling. These are the messengers that reach out, that note things, that take impressions, that bring these impressions to the brain where they are worked up into ideas. The keener the observer the clearer the idea, and ideas to-day are worth dollars. It should be the business of every man to consciously train these physical senses and he must wake up to the fact that they are his trusted messengers which bring to him the ideas, which he can coin into dollars.

The world wants men of ideas, men who can observe things. He also must possess a good memory, because the memory is the storehouse of the impressions, of the ideas that come into the mind. Every business man knows that the memory is a great asset, but very few realize how great an asset it is. The negative of memory is forgetfulness, and many, many an error on the part of the employee is traceable to this negative of forgetfulness.

He must also possess a good, free imagination, which is the ability to take the ideas stored in the memory, reconstruct them into new plans, new methods, new achievements. The great men of the world are all men who have strong imaginations. The world would die but for imagination. Life would not be worth the living. There would be no achievement. Before gas was ever given to the world the possibility of its uses was conceived in the imagination of some man. Before an artist paints a picture it is created first by his imagination. Before anyone makes the slightest progress or improvement in any direction, imagination shapes it before it is produced in fact.

No man is worth more than $2 a day from the neck down, but he is worth from $2 a day, to many thousands a day, from there up, and it all depends upon development. And the imagination is one of the greatest faculties brought into play on the part of successful men. The negative of imagination is obtuseness. The employee who is working along blindly in a rut, purely mechanical, is obtuse. The one who is quick, alert and progressive, and planning and improving in his methods and his results, is using the faculty of imagination. But, conscious training of this faculty, as of all of the others of the body and the brain, obtains such startling results that it is high time the commercial world was realizing the necessity of methods for stimulating them.

Give me a man of good physical strength, one who possesses good, strong mental faculties of perception, of memory, of imagination, of reasoning, and I'll show you a man who has constantly developing ability and who will surely do things.

Endurance and ability are not all that is essential to real success on the part of the individual, to himself or to his employer. He must be reliable, and reliability springs directly from such qualities as reverence, loyalty, enthusiasm, love, ambition, courage and faith. Just look for a moment at the negatives of these qualities: Irreverence, disloyalty, listlessness, hate, apathy, fear, doubt. An irreverent person cannot have good ideals. Without good ideals we do not have good habits of thought or of action; and many an error is traceable to that. It is needless to say how many errors are traceable to disloyalty. And yet I want to say that loyalty can be trained in the individual just as surely as the muscles of the body can be trained, but the individual must first wake up to the fact that it is in accordance with natural law, that it is to his own best interests, and then be shown the best methods of cultivating it.

A listless, indifferent employee is worse than no employee. He must possess enthusiasm and that enthusiasm can be developed in every employee worth having. He can be made to feel a genuine love for his work, for the people around him, for the profession in which he is engaged, for business is surely as much a profession as the other so-called "learned" professions. He must get over his apathetic condition. Too many employees are imbued with the idea that they are doing all they are paid for, and will be "darned" if they will do any more. He must have the ambition to climb the ladder of success, but that ambition must start in with a realization of the fact that he must first "make good" where he is. He must eliminate from his make-up the negative of hate, he must develop the quality of love, he must build within himself a sunshine factory, because it is one of the greatest generators of a magnetic personality. Love attracts, hate repels; love wins, hate loses; love is the oil that moves the machine of life.

The negative of fear is really the cause of nearly every lack of success. We come into the world crying with fear, and all through life the element of fear prevails to deter us from accomplishing things. But man has the ability to eliminate it from his makeup. He can have courage unlimited; and courage means the backbone instead of the wishbone. A man will have courage if he has faith in himself, if he has faith in the institution, if he has faith in the goods sold by the institution, and if he has faith in the people. The negative of faith is doubt, and doubt has slain more men than all the armies of the world have killed.

These qualities all belong to the emotional or feeling side of man, and you, gentlemen, know to what a great extent errors are traceable directly to this department of mind. While it is true that every normal man has the same set of muscles and nerves, although differently developed, it is also true that every normal man has the germs of every positive faculty and quality of the mind and soul, but they are differently developed.

While it is true that physical exercise will develop every physical

muscle, it is also true that the right kind of mental exercise will train each faculty of the mind and soul to a marked degree, and it's the "marked degree" business that counts.

Let me mention the greatest faculty of all, the Will, the supreme power that sits in command of the forces of the mind. It is through the will that we can accomplish what we wish. The will, properly tuned up and directed, can gain almost any result. Let us liken an individual to an engine; the body to the mechanical structure; the mind to the fire under the boiler; the soul to the steam that is generated. An engine can be on the track, all the parts in perfect order, a big fire under the boiler and with plenty of steam on and yet not move, unless the lever is pulled back and the whole thing set in motion. This lever is action and the will has the control of it. It is the power of choice and action. It is the power that directs and guides and controls. An individual's power and effectiveness are measured by the strength and use of his will. The will calls into play each of the faculties and qualities of the mind, and once it knows how to do and is told to do, it can accomplish anything.

So much for the character and health of the individual. This applies to every department of activity, and the crying need of to-day is efficiency. Efficiency depends upon the development of these faculties and qualities. Every man is a bundle of wonderful possibilities. It is simply a question of development. Is it wise for any institution to besitate longer to put into play the agencies which will cause such development and results?

I was to talk to you to-day about "The salesman and his relation to to the gas dividend," but in the question of salesmanship the emphasis must be upon the *man*. If the man is all right, if he is truly educated, becoming better educated every day, the sales will, to a very large extent, take care of themselves.

I have talked particularly about the "eductive" part of education, and I want to take up just a little more time about the "instruction" part of education, of the infilling of useful knowledge, so that a man can direct his power and energy in the paths that will bring results, and the track for this human engine to run upon is the knowledge that he has of his own particular line of business. Salesmanship is the power to persuade people to purchase at a profit that which you have to sell. We have discussed the power, now we will discuss the people.

A business man, and especially a salesman, must be a good student of human nature. He must be able to read that open book of humanity written in the faces and actions of men. Most men have been depending upon the knowledge that they could pick up and have depended to a very large extent on what they supposed was the intuitive faculty, and while it is true that we do gain much knowledge from our own experiences, yet some of the greatest minds in the world have made it their life's work to study this problem, and from them we can learn how to meet with people and handle people in a way that wins success. In order to handle people successfully, we must operate in harmony with the law of non-resistance, and it is essential that we become more proficient in the reading of the types, temperaments, motives, habits, ideals of people, so that we can shape our arguments in a way that will best appeal to them.

The next thing that I would suggest is a close application to the study of logic as applied to business. Logic is the ability to analyze our proposition so that we understand all the points connected with and surrounding it, and then to be able to state those points to the customer in such a way they will naturally impress his mind. The old-fashioned human windmill or verbal cyclone has gone out of date. To-day the salesman must be one of points, points, points.

A man cannot know too much about his own proposition. In application of this subject to the gas business, I would suggest the advisability of having employees who come in contact with the public make a thorough study of the gas business in all phases of both manufacture and distribution. He should be taken through the plant and shown all the details in connection with the making of the goods. He should make a thorough study of every possible use to which gas can be put. He should study all the appliances that have been invented for this purpose. He should get this information as nearly as possible from the manufacturers of the appliances. He should discover, as far as possible, new ways for applying your product. Having a good grasp of all the points of advantage of your proposition for the customer, he should study them out to perfect himself in explaining these points in such a way they will naturally appeal to the mind of that customer.

Much depends upon the sequence with which points are stated. One arrangement of points may be logical and directly appeal to the mind; another may be illogical and confusing. Each point should be considered an arrow to be shot into the mind of the customer, and much attention should be paid to the sharpening of these points so that they will go in straight and true. By this I mean he should study expression; clear, clean-cut language, good phraseology, good tone, utterance, gesture and facial expression.

A salesman is, or should be, an orator in the practical sense of the word. His audience may be one or it may be a thousand, but the real orator studies natural effects, not artificial ones. Most men are unnatural in their expression. The greatest study of the actor is to be natural, and it requires study, thought and work. And when we are most natural we are most convincing.

Finally, business men, and salesmen in particular, need to acquire a more thorough knowledge of the workings of the human mind. He must learn why it is that certain things affect the mind and why other things do not. He must know more about the mental processes through which the mind of the customer goes before a sale is made. He must get in closer touch with the mental law of sale. He should realize that he must carry the mind of the customer up four steps: First, attention; second, interest; third, desire; and, fourth, resolve to buy or decision.

The mental law of sale is this: Attention once secured will naturally change to interest; interest intensified will naturally change to desire; and desire made strong enough will naturally change to decision to buy. Few men really appreciate the importance of that first step of attention. They do not realize that it means ridding the man's mind of other thoughts, so that he can concentrate on what is being said. Once attention is secured, he must quickly shoot such arrows (points) into the mind of the customer, that he will immediately become interested; then he must hold that interest by shooting in more and more points until desire is created. He must develop that desire until he can note the customer has about arrived at a decision, and then quit talking and act. More sales are lost by overtalking than undertalking for want of a better understanding of this great law. There is a delicate balance in the mind of the customer; the time between desire and resolve. It must be appreciated by the salesman and his actions and address be governed accordingly. The study of psychology has made wonderful revelations to the business man in this respect, and by him who masters and applies it many a sale will be made that has heretofore slipped away from him.

These are all points, gentlemen, that must challenge more and more the attention of seekers of business success, and particularly the proprietors of institutions, so that they can adopt plans for development along these lines, and thereby at once do more to increase the assets of the company than any other one thing they can do.

One of the great slogans of to-day is that of co-operation. In harmonious action, in team work along the lines of true education, will come the true and permanent success of the future. Proprietors must themselves encourage, financially and morally, the best of such methods. They must participate in studies along these lines with their employees. They must organize them so that the men of the different departments meet together, the employer meeting with them. They must learn to study together and thereby at once get better acquainted with each other; getting the benefits of each other's ideas, developing a love and enthusiasm for the work and for the institution with which they are connected, thus realizing that they are all a vital part and all interested in the success of the enterprise. Employers must be willing to spend money to get such results. They must be willing then to reward proportionately the development in increased results on the part of the individual. Then will come true progress based upon the law of mutual benefit.

What an inspiring sight it is to see all the individuals of the composite salesman working harmoniously in a true spirit of brotherly love. The proprietor is going hand in-haud with his employees in this march of progress, all singing the songs of labor and love. The age wants more large-hearted, manly men; the age wants heroes, heroes who will dare to stand and struggle in the solid ranks of truth. And in this onward march, this joyous throng all chanting in unison the great hymn of progress to the words of:

Go on, go on, go on,
Go on, go on, go on,
Go on, go on, go on, go on,
Go on, go on, go on.

Domestic Gas Lighting from the Fixture Manufacturer's Standpoint.

[A paper read by L. R. Hopton, M.E., New York, at the January meeting of the National Commercial Gas Association.]

Upon taking the floor before this august assembly, my first duty is to thank the National Commercial Gas Association for the privilege of appearing before this convention and contributing in a small way to its proceedings. At the various conventions of Gas Associations held from time to time in different parts of the country, we fixture manufacturers may be present as interested listeners and may inbibe some useful knowledge, but as we cannot talk B. T. U.'s nor argue on pressure drops in mains, therefore we rarely make any attempt to be heard,

The salesman, traveling from place to place with his catalogues and photographs and making you his periodical visits, is generally the only means by which we can make our needs and opinions known to each other. For this reason I am doubly appreciative of this opportunity and have selected a subject with no narrow limitations and one that will permit me to speak of things nearest to the fixture manufacturer's heart.

You may not be aware that the lighting fixture, and particularly the gas fixture, like all good things in this world, has been developed by gradual stages. Where or in what form artificial light was first used to prolong man's working hours will probably never be known. The flaming torch of some combustible material stuck into the ground may have been the first type of lighting fixture. We are told that the lamp was born in Egypt, thence carried into Greece, where it was consecrated to the Goddess of Learning, Minerva. It soon found its way into Rome, where, in harmony with other ornate decorations, it was made of bronze, often heavily adorned with jewels and with inlays of silver. In addition to the ordinary needs of illumination it has had its part to play in religious worship, where the so-called "Everlasting Light" was placed to guard the tombs of ancient dead, symbolizing, by its ceaseless burning, the immortality of the soul.

In every age and every land the instrument of lighting has been also an instrument of decoration, and few more interesting subjects for study are to be found than that of the history of ornament as it has been developed in this way. No sooner was a new fuel, or a new means of lighting, found than the appliances for using it were appropriately formed and decorated.

The first gas fixture may possibly be considered to have been the bladder full of gas which Mr. William Murdock, of Cornwall, England, lighted one evening, in the year 1792, for the edification of a few invited guests. Developed first in England, and introduced in this country by David Melville, of Newport, R. I., in 1806, gas as used for lighting has enjoyed a steady development. The earlier gas fixtures were curious structures, and, being made before the appearance of iron pipe, were both expensive and cumbersome.

It is not my purpose to go to any further length into the early history of the gas fixture, but I do wish to emphasize the fact that as the use of gas for illuminating purposes became more general the gas fixture continued to enjoy a fairly steady development, both in workmanship and in artistic merit. With the advent of the electric lamp, however, the development of gas fixtures received a remarkable quietus, notwithstanding the fact that for a short period electric lamps were used largely as attachments to existing gas fixtures. In the case of the electric lamp this transition period did not last very long, so that in a few years manufacturers were called upon to turn their best skill and expend their best possible workmanship on the construction of fixtures for use with the electric lamp. While this may be only what should have been looked for in view of the many advantages of the electric lamp, to the man interested in gas fixtures it is not very consoling to know that over three-fourths of the fixtures put upon the market to-day having any claims to artistic merit are adapted to the use of electricity only. The introduction of the Welsbach mantle brought about a new condition of things. It has been said that the mantle saved gas from passing into oblivion from the field of illumination. While this is of course an exaggeration, it certainly gave gas lighting a very pronounced stimulus. Like its predecessor, the electric lamp, the first appliances for use with the mantle were crude and unsatisfactory, but they were sufficient to demonstrate the great possibility of this form of lighting from an economical point of view.

I cannot summarize this portion of my talk better than to say that we have before us two axioms, truths that may be taken as self-evident. The first one is that gas for lighting cannot be made as convenient nor as artistic as can electricity. The ready means of control by switches at remote distances and the absence of any great heat of combustion render the electric lamp of particular value as a lighting medium. Gas lights cannot be used to produce the beautiful effects obtained by embedding the electric lamp in ceiling and cornice decorations, nor can they be used in many of the elaborate, concealed light effects. Proper disposition of the heat from a gas light must be carefully considered; and, notwithstanding the spark lighting attachment, the pneumatic valve, or the self-lighting mantle, there is no device for lighting gas as ready as the electric lamp. In short, fixtures can be designed and effects produced that are absolutely impossible in gas lighting.

The second axiom is that the electric light, candle power per candle power, is more expensive than the incandescent gas light. Electricity must be generated by means of a steam boiler, engine and dynamo, while gas is generated from coal or other materials and used directly as a fuel to produce light. For domestic purposes the electric light costs anywhere from ½ cent to 1½ cents per 16-candle power per hour, while the mantle gas light costs about $\frac{1}{10}$ of a cent per hour for the same unit. I am well aware of the rapid strides being made by inventors of electric lamps and noticed particularly a very optimistic opinion expressed by Mr. Lansingh, in a paper read before the American Gas Institute at Chicago last October. He states as follows:

"During the past year the situation from the electric standpoint has materially altered; there has been, in many cases, a reduction of rates, often of a more sweeping nature than corresponding reductions in gas, but the principal change has been in the introduction of new lamps of higher efficiency. The first lamp of this nature to appear on the market was the Gem or high efficiency type, consuming 2½ watts per horizontal candle power. This was followed by the Tantalum lamp, consuming 2 watts per candle power; and the electric industry is looking forward to the introduction of a new style of lamp, the Tungsten, which is promised for the market at 1¼ watts per candle power. Other types o lamps such as the Osram, Osmium, Zirconium, Kuzel, etc., give promise of even higher efficiencies and it is confidently expected by the electric trade that within 2 or 3 years there will be lamps on the market with an efficiency of perhaps ½ watt per candle or ⅓ of the present 3½ watt standard. Granting, however, that for some time to come the 1¼ watt lamp will be as high an efficiency as will be attained in commercial practice, we see that the electric man will be able to reduce his current consumption from 3½ to 1¼ watts per candle or a reduction of nearly ⅔ of the present cost. We, therefore, see that with the introduction of a lamp of this type, gas will be placed in the same position, perhaps not quite as good, as it was when we had only the old type of burner and the old 4-watt incandescent lamp. The cost of electric lighting then will not be greater than 1½ times that of gas and with a possible reduction to equal or even lower cost."

Notwithstanding these interesting arguments, it may safely be stated that the incandescent gas light is very much cheaper than the electric lamp. Of course, there are favorable locations near abundant water power, where electricity in cost may come into closer competition with gas, but on the other hand, there are locations where nature has given the gas man an abundant supply of gas, which he can secure by merely drilling into the ground and piping. In general, it may be said that we face these two conditions: The greater adaptability of the electric light and the greater economy of the gas light. While the gas appliance man has doubtless made the most of his advantage in low cost of lighting, I hope to show that he has not gone as far as possible in the other direction, namely, the increasing of the scope and attractiveness of gas lighting. No one knows better than yourselves the limitations of your particular fields and the needs and sectional peculiarities of the public that you aim to serve; but while each of you caters to a small section or coterie, the manufacturer of fixtures on a large scale is in touch with the needs and special requirements of all parts of the country. By our contact, not only with the buying public, but with decorators and architects, we are perhaps in a position to obtain a broader view of the situation, and to see a phase of the field of gas illumination that is not accessible to the gas appliance man. We know with what aversion a large portion of the public treats anything in the way of gas fixtures. We are constantly reminded that decorators look on them as things to be avoided, and that many architects advise against them wherever possible; and this aversion exists in face of the fact of increasing cost of installation, by reason of rigider requirements on the part of the Boards of Fire Underwriters. While this state of feeling is principally due to the pronounced advantages of the electric light, it is also fostered in large measure by the way in which gas lighting is being handled to-day. To these people of refinement, gas lighting is associated with the ugly fixtures, crude and unfinished attachments, and all manner of inconveniences. They will cheerfully have their houses piped for gas ranges and water heaters, but are willing to pay much more for electric wiring for the use of electric lighting fixtures. Of course, this condition does not work disadvantageously to the interests of the large fixture manufacturer. He is equipped to make any style of lighting fixture that may be called for; but to the man interested in gas fixtures and the more general use of gas for illumination, it is a situation that must be seriously considered. Notwithstanding the fact that both electricity and gas are frequently furnished by a single company, there exists a natural rivalry between the appliance men in the two departments, and the gas appliance man must do all in his power to build up and maintain his department. In cases where there is keen competition, such as exists in many Western cities, it is of still more importance that the gas

appliance man should do all in his power to overcome this aversion on the part of the public to the use of gas for illumination.

It seems to me that the general public may be divided in three fairly well defined classes regarding their attitude toward the question of lighting: The first class may comprise that large portion of the public which considers but two things, candle power and cost; and by cost, I mean not only first cost but also the cost of operating and maintaining the fixture or burner. To this class may be assigned all store and shop lighting, where arcs and other high candle power units are more commonly used.

It may be natural to suppose that in such cases the lighting fixture is considered as a necessary mechanical appliance, useful for the few hours that it is lighted and during this time expected to produce most economical results, but a bothersome and obtrusive piece of mechanism during the many hours that it is out of commission. While some attempt has thus far been made to construct these high power gas appliances more ornamental, it is interesting to observe the form in which the electric arc lights are being used in some of New York's largest retail stores. Attractive and in harmony with other decorations, the effect is noteworthy. The gas arc has a large field of usefulness and has certainly been a boon to gas companies and appliance men. While from the standpoint of scientifically correct illumination it is questionable whether it is best to group the light into single high power units, the fact remains that as a companion or substitute of the electric arc light it has a large and growing field. In this class also should be included a large portion of the public, who, interested in domestic lighting, are largely the buyers of the cheapest fixtures and the single burners. Attracted by some advertisement or impressed by the light-giving qualities of some type of burner, they aim to get light and lots of it. They want as much light as possible in one burner, want it with the consumption of little gas, and seem perfectly willing to sacrifice simplicity of construction and neatness of appearance to this end. These people care little if the burner has a Bunsen tube 3 or 4 inches long, and will load it up with chimneys, reflectors, diffusing cups and metal work, if by so doing they can increase the light. They will put on a neat and well appearing chandelier, a single powerful burner, and use it for the entire illumination of a room. With people of this class, the fixture manufacturer rarely comes into direct contact. They buy their fixtures and burners from supply dealers and from gas company stores, and their purchases form a large portion of your business.

A second class we might consider is the large and fortunately growing portion of the public, which considers appearance and workmanship as well as candle power and cost. People of this class exercise greater care in the selection of their fixtures and burners and desire them to be of good workmanship and as attractive in appearance as possible. They desire a better distribution of light and prefer to use a number of smaller units on their fixtures, even though first cost and cost of maintenance are a little more. While they are not always satisfied with the attachments necessary for good illumination, they secure the best they can, and desire their appliances to match the fixture in finish and glassware. Many of these customers are sent to you by buyers and architects and they generally invite your aid in making their selections.

In still a third class may be considered that portion of the public which considers candle power and cost of secondary importance and attaches the greatest importance to the decorative and harmonious appearance of the fixtures. The gas appliance man does not as a rule come in contact with this class, as these people generally use electricity for lighting and buy principally from the manufacturers, in consultation with their decorators and architects. To them the lighting fixture must be an ornament that is in absolute accord with their scheme of decoration. They are willing to pay a good price for the fixtures that meet their fancy, but are critical in their selection and exacting in their requirements. There are numerous cases where people of this class have elected to use gas for illuminating purposes, and for them some really beautiful and interesting effects have been produced. Now, having touched upon the history of the case and having analyzed the symptoms, let us proceed to prescribe a remedy.

1. Equip your departments to properly sell gas fixtures. While this remedy is more applicable in some cases than in others, a majority of appliance departments are not equipped to properly handle this portion of their business. Generally the salesmen are not trained to sell fixtures. It takes years to make a first-class fixture salesman to sell fine goods, yet the selling of gas fixtures is left to clerks or others equally unfit, who can recite without a pause the advantages and claims for economy regarding gas ranges and water heaters, but who know nothing more regarding a fixture than the information given on the price tag. Such a salesman cannot properly understand a customer's requirements nor talk intelligently with critical buyers of good things. Train your salesmen to understand and appreciate style and workmanship. Have them interest themselves in the customer's needs and peculiar conditions, and let them give that intelligent advice and aid that a customer has a right to expect of you. Remember, many of those customers appreciate good fixtures, and while they may not have a clear-cut opinion as to what they especially desire, they are dissatisfied if you do not appear to realize just what a problem the selection of their lighting fixtures is. Encourage them to pay a fair price for something worth having, and in the words of the familiar saying, "The satisfaction with the quality of the article will remain after the price has been forgotten." Have your samples displayed to the best advantage. A small stock of well-selected fixtures, arranged in an attractive manner, is vastly better than a large number of samples crowded together and poorly arranged. To the average customer nothing is more bewildering than to gaze upon rows and rows of samples and attempt to make a selection. Of course, you are obliged generally to fill orders from stock and customers desire the display of a number of samples from which to make their selection; but let the method and arrangement of display be one of your first considerations.

2. Be dignified in your advertising. There seems a tendency toward exaggeration in the advertisements of gas appliances that has the effect of lessening the confidence of the public in all gas appliances. While appliance managers are perhaps not directly responsible for this, they can certainly exert a strong influence in the right direction. What would you say if you saw advertised to-morrow that a new incandescent electric lamp had been put on the market, giving 100-candle power for 50 watts of current? It is equally as absurd to expect such an announcement as it would be to credit it. My attention has been repeatedly called to advertisements of electrical appliances, and I noticed particularly one describing a new electric lamp recently put upon the market. The statement is made that it is a 2-watt lamp and should develop 22 candle power, with a consumption of about 44 watts. If you have occasion to purchase this appliance and test it, you are reasonably certain that the figures shown in the advertisement will be verified, and you are much surprised if you find a gross misstatement of facts, On the other hand, in recent popular magazines I have noticed advertisements of gas lamps, which are excellent devices, well made and good sellers, but advertised to give 200 and 300-candle power with a consumption of but a few feet of gas per hour. What would you say if an agent called upon you with the statement, that he had a burner that would give 100-candle power to the cubic foot of gas? Wouldn't you sit up and listen if he even had 25-candle power and you could place full confidence in his statement? A short time ago a salesman strolled into my office to show me a new type of gas arc, having 4 burners for 4 mantles and a large globe covering the whole cluster, He evidently did not know that he was "bringing coals to Newcastle." I became interested to hear what he would say, and asked him a few questions. "This light is wonderful," he said. "It will give you 1,000-candle power, or as much as an electric arc light." This was truly something startling, and I asked him how much gas it would consume. "About 10 feet an hour," was his reply. Truly, this was more startling. I looked over the familiar needle valve, Bunsen tube and mantles and remarked the only novel feature that the appliance seemed to possess was the long length of the Bunsen tubes. "That is what does it," he told me, "only those are not Bunsen tubes, because we make them ourselves." This may be an exceptional case. I hope it is, but just such representations tend to discredit gas for illumination.

3. Encourage the adoption of smaller and better distributed units of light. A recent editorial in one of the scientific papers on high power light units gives a very interesting opinion on this question:

"That there is a general tendency toward the using of higher units is plainly evident from the facts. So far as there is genuine competition between gas and electric light, the contest is usually to see who can produce the greatest flood of light for a given expenditure, entirely regardless of the visual and aesthetic qualities of the illumination produced. The incandescent gas burner, with its fairly dazzling light of 60 rated candle power, or more, could only be beaten by a cluster of the standard 16-candle power electric lamps, or the electrical arc. To compete with the latter, the "gas arc" was produced, which was simply a cluster of incandescent mantles. At last accounts, electric lighting had scored a complete victory by the introduction of the flame arc, which has left the gas arc and all other forms of illumination hopelessly behind in the race for garish brilliancy.

"In many respects the contest reminds one of the country band

tournament, in which the band that made the most noise won the prize. Increase in light power by closely clustering small light units, has usually and rightfully been condemned by illuminating engineers; and the most serious fault of the arc lamp has been its necessarily high light power as well as high intrinsic brilliancy.

"There are doubtless many cases where multiple lights, either in clusters or in chandeliers, can be very advantageously replaced with the more efficient units that are coming into use, but the ordinary dwelling house certainly does not afford such a case. While the general race of each to outshine his neighbor is interesting along 'The Great White Way,' there are few who wish to carry the contest into their private apartments; the rest and eye comfort resulting from a soft and comparatively low intensity of illumination are still demanded for the home. The chandelier with multiple lights, or the cluster, has the advantage of affording a variable illumination, and on this account alone must always take precedence over the single unit of high power for private lighting."

I do not intend to unduly criticize the gas arc in this statement, although prominent gas company men have expressed their disapproval of its general use, and a few years ago the American Gas Light Association had a lengthy discussion on this point. I do intend to criticize the use of powerful burners on a single arm of a chandelier or bracket. The only thing this method of lighting has in its favor is, that it is cheap. It does not give good illumination, it is bad for the eyes, and it is artistically barbarous. What is needed is a scattering of smaller units, thereby producing a better illumination, and at the same time an attractive appliance for lighting. Personally, I am a strong believer in the miniature mantle, such as No. 63 Welsbach. This little mantle gives much more candle power than a standard electric lamp and is the size used very generally by one of the largest makers of burners and appliances for gasoline gas in the country. I shall be very glad to see a mantle and burner put on the market of a size between this and the usual standard, something about the size of the No. 2 Kern mantle, that would give 50 to 60-candle power with about 3 feet of gas. Such a mantle could be used with standard electric glassware and would be a very useful size for fixture purposes. Regarding the inverted type of burner, I can only say we are watching its development with much interest. In Mr. Lansingh's paper, to which I have already referred, he says:

"There are, of course, many disadvantages to-day with the inverted burner, chief of which must be reckoned the discoloration of fixtures, and it would seem that the gas engineer has a fruitful field in getting fixture houses to design a line of fixtures which are especially suitable for the inverted type. Even the question of finish is important, as the ordinary brush brass or polished brass fixture tarnishes very quickly with the heat. If, on the other hand, finishes such as verde antique or other dark finishes were used on both burner and fixture, the discoloration would show very much less. Of course, in many cases such finishes would not be suitable, but where they can be used it will do away largely with this serious objection. The attempt to adopt the inverted burner to the present type of fixture is generally unsatisfactory, but it should be an easy matter to design fixtures which will be suitable for the inverted type, so that it will be available in many places where not suitable at present."

These suggestions regarding fixture construction, can be carried out if conditions warrant the expenditure of the necessary time and money, and I trust that I may hear an expression of opinion from you on the question.

4. Raise the standard of the appliances and especially of the fixture that you sell. Too often, sad to say, the buyer of fixtures knows little of style or artistic value, and not much more of good workmanship. His standard seems so much brass for so much money; and the manufacturer, striving to maintain a reputation for well made and really good fixtures, well finished and artistic, is turned down for the smaller maker, who buys stock, castings, shells and other metal work, employs cheap and inferior help and makes a mongrel design at a few cents lower price. These manufacturers receive very little encouragement in their attempt to elevate the gas lighting fixture and thereby the whole tone of gas lighting. Of the appliances that you carry, let your ranges and water heaters be well made, efficient and economical; let your mantles be good and reliable; let your burners and other attachments be well made, efficient and as attractive as they can be procured; but above all, let your fixtures be well selected, well made and attractive. These appliances, more than anything else you handle, should be both instruments of usefulness and of decoration.

To show you what may be done in the way of constructing attractive fixtures for the use of gas, I am appending to this paper a few photographs of brackets and chandeliers that have recently been made on special orders. Several of these fixtures have cost into the hundreds of dollars to make and one of them was recently made for a fine New York residence at a cost of over $1,000. I think you will agree with me that they are a little above the ordinary type of gas fixtures, and are not only samples of good workmanship and high artistic merit, but show that gas still lends itself to attractive designs and that people still have sufficient faith in gas to pay the price for good fixtures.

In closing, let me again thank you for your kind attention to this paper. By working in harmony, we can I am sure be mutually helpful to one another, and if I have said anything that will tend to further the cause of gas lighting I shall be amply repaid.

[Translated for the JOURNAL by MR. FREDERIC EGNER.]

The Vertical Retort Oven and the Future of Gas Making.[1] No. II.

By DIRECTOR EISELE, of Cassel, Germany.

You may also remember that, soon after the Darmstadt meeting and the beginning of the Dessau experiments, another quite interesting vertical retort made its appearance before the public, viz.: The Settle and Padfield system, at Exeter, England. It is here shown in Fig. 2.

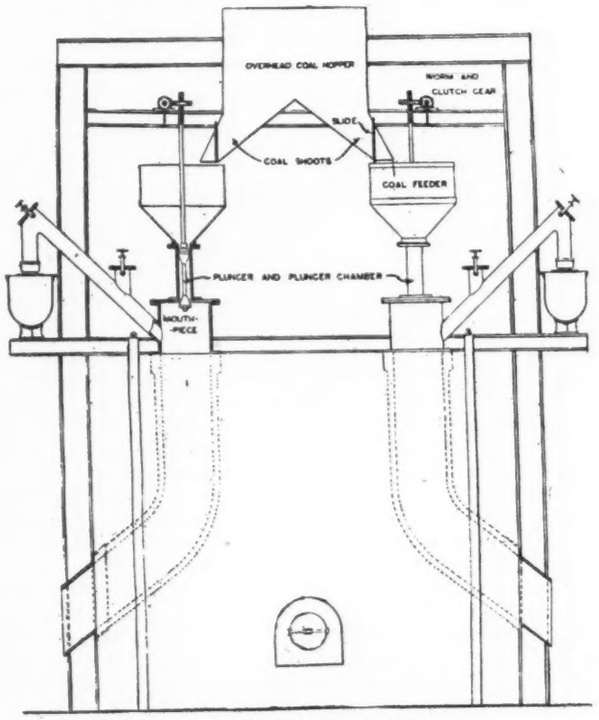


Fig. 2.—Settle-Padfields Vertikalretorte, 1903.

In the direction and object to accomplish continuous gassing it is a noteworthy step in advance, inasmuch as in this system the rather easy problem of a steady feeding of the retort is sought to be solved, while the more difficult one of a continuous withdrawing of the spent charge of coke is as yet unaccomplished.

The continuous feeding of coal into the retort is caused by the up and down movement of a piston rod which carries two pistons some distance apart in a cylinder, the upper end of which ends in a coal hopper, and the lower end in the upper portion of the retort mouthpiece. On the upward stroke the space between the pistons is filled with coal, which drops out into the retort when the downward stroke is about over. The discharge of the coke is periodical through a lid at the lower end of the retort which, while vertical the most of its length, has an outward bend near its lower end, so that the retort in appearance is somewhat like a vertical retort with an inclined retort attached to it at the bottom, a sort of combination of vertical and inclined retort. Besides the trial bench at Exeter it is stated that there are several others under trial also; one at Rotterdam, with 12 retorts, and

1. *Jour. fur Gasbeleuchtung.*

in the Berlin works "Tegel" one with 6 retorts is in course of erection. I have been unable to obtain information as to the results obtained; but the feeding by means of a piston, seems to me to be rather crude, as a portion of the coal must be getting sheared and crushed with each movement of the piston.

A bold step in gas manufacture by means of vertical retorts was undertaken by the well known gas engineers, Messrs. Woodall & Duckham, at Bournemouth, England (see Fig. 3), who, with their experi-

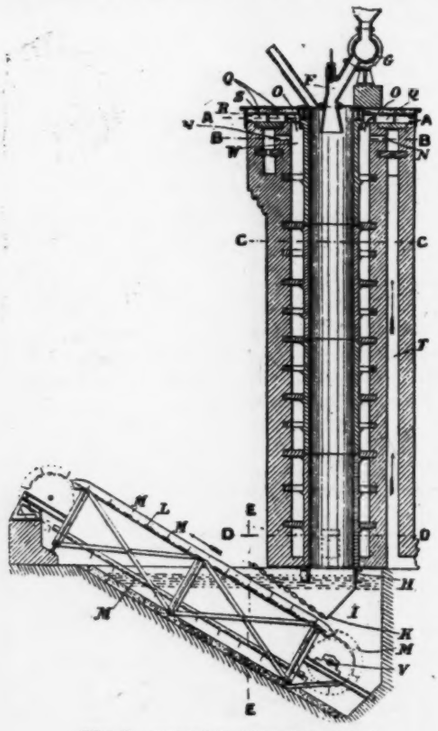


Fig. 3—Woodall-Duckham Ofen, 1904-05.

mental bench of 4 retorts, each 19 feet 5 inches in length, aimed at nothing less than the continuous production of illuminating gas. This is indeed a most laudable and desirable ambition, when one remembers that all the periodical charging and discharging systems are accompanied by the disadvantages of intense heat, disagreeable vapors and impenetrable clouds of steam arising from quenching the large body of discharged coke, and that injury to the working crews from the sudden violent outrush of incandescent coke is not an impossibility; and that it always is, at best, a tiresome and extraordinarily rough job. If, and to what extent, our English colleagues have succeeded with this grand problem I am unable to say at this distance, for we had only very scanty information[1] at our disposal on the subject, but it is my impression that the charging device (with its reciprocating, shearing and coal crushing piston) is not exactly the happiest solution for that subject. And like remarks hold good for the discharging arrangement, which is a coke conveyor, passing under the water sealed end of the retort, and thus removing the thoroughly water-soaked coke which in that condition will scarcely ever get rid of the over-absorption of water.

But Messrs. Woodall and Duckham themselves have abandoned the latter device for coke removal, employing instead a reciprocating conveyor-band, which, being chiefly located above the water seal of the retort, only dives below it for a short distance where it must pass under to tear away the descending coke and bring it out. The Englishmen who differ from the German people and their Dessau retorts, are naturally quite enthusiastic over the invention of their countryman. The problem is indeed a noble and thankworthy one, but that the solution has already reached a perfectly satisfactory stage, appears to me, since accurate results have not been made public, still somewhat doubtful. Other vertical retort oven designs have arisen, as, for instance, that of Rummens[2] and Lachomette, at Paris. Both of these designs are similar to the Dessau examples. Then there are the designs of Verdier and Teulon, of Marseilles, France, for continuous operation. In the latter design the retorts are of uniform dimension throughout, from top to bottom, and at both ends are fitted revolving, hollow-chamber valves for the purpose, respectively, of filling the retort with coal and removing coke at each revolution. This revolving chamber valve is presumably quite unsuitable. Also, is Baker's (of Budweis, of "Budweiser" fame) design, who arranges his retorts in a circle[1], but which in other respects offers nothing especially new.

Kämpfe Brothers, of Eisenberg, show a vertical retort design looking very much like the Settle-Padfield oven, but without the continuous charging arrangement. That design impresses one as quite practical, and may well be considered along with the rest, during the transition period until the desired, sought-for, continuous gas production has become ripe for practical application. The Messrs. Martin and Pagenstecher, at Mülheim-am-Rhein, are said to have designed a vertical retort oven and to have a bench under construction at the present time, Working results have, however, not yet reached the public or come to my knowledge, and presumably benches on that design have not yet reached the operating stage. The subject of vertical retorts appears to be pursued with much attention and ardor in England.

There the *Journal of Gas Lighting*, printed a series of articles[2] by Mr. Young, of Peebles; W. R. Herring, of Edinburgh; and Thomas Glover, of Norwich, which contained much of interest from the past and present time. It was pointed out that vertical retorts had been used in England 40 years ago, not so much for the production of gas, however, but rather with the object of obtaining paraffine oil and ammonia. See Fig. 4, showing Young and Scott's vertical retort of

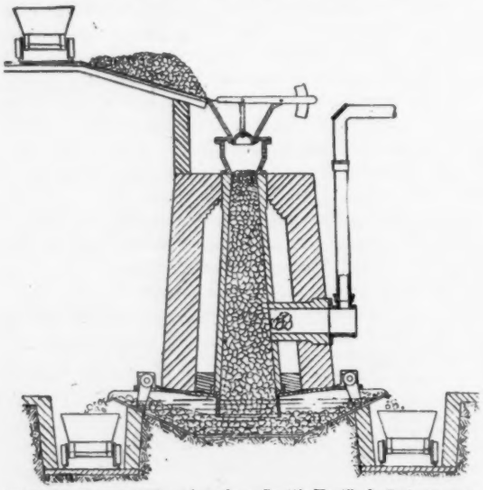


Fig. 4.—Young, 1872, and Andrew Scott's Vertikal-Retorte, 1874.

1874. While these retorts of another, but closely related, industry hardly served as models for the newly-evolved vertical retorts of the illuminating gas industry, they are nevertheless pioneers, and as such deserve consideration at this time and place, the more so since from these have been deduced and proposed, some highly interesting designs of construction for modern gas producing vertical retorts.

The first vertical retorts used in the Scotch oil industry originated with Mr. Young, who, while watching the process in horizontal retorts, among other interesting observations discovered that in wholly filled retorts the production of oil predominated, whereas in filled retorts the production of gas prevailed. But since in a completely filled vessel the removal of the residue presented difficulties, he tried, at first with a steam blast, and later on with a gas blast to blow out the retorts, and more quickly remove the vapors in the only partially filled ones. This method not satisfying him, in 1867 he began experimenting with vertical retorts, which resulted so much to his satisfaction, because a much larger quantity of oil was produced, that his ovens were soon introduced in Scotland in considerable numbers. By blowing through the retorts with a stream of gas, Young found strikingly scanty ammonia returns, but when after the exhaustion of oil he again sent a current of steam through the retorts there also reappeared a greater production of ammonia. From this it was learned that the presence of steam had a specific effect on the formation of ammonia, in consequence of which observation the former current of gas was replaced by one of steam. After Young had introduced his ovens in many Scotch works he also erected one in 1872 with 4 retorts for the manufacture of illuminating gas for the Musselburgh Gas Company. See Fig. 4; also, King's Treatise, etc., Vol. 1. As the gas take-off was pretty well down, and

1. See JOURNAL, Vol. LXXXV., pp. 55-7.
2. See JOURNAL, Vol. LXXXIV., p. 136.

1. See JOURNAL, Vol. LXXXIV., p. 91.
2. See JOURNAL, Vol. LXXXIV., p. 149; and Vol. LXXXV., p. 145

the lower end of the retort was closed by a water seal, in that contrivance it became manifest that the vapors were not sufficiently fixed or converted into gas, and that there was an excessive production of carbolic acid, which was erroneously charged to the water seal. Furthermore, there were sometimes sudden and voluminous formations of steam, when the coke had been clinging to the sides of the retorts it then would suddenly let go, falling into the water seal in a large mass. The cause of this was evidently that the gas take-off was not sufficiently high up to insure the formation of CO, to which besides the coke would easily cling, afterwards splashing down into the water with great violence, as has just been stated.

These at the time insurmountable drawbacks then occasioned the abandonment of water sealed retorts. In 1882, Messrs. Young and Beilby patented an oven the retorts of which were provided with locked lids at the bottom end, which under the name of the Pentland oven, Fig. 5, was adopted at most of the Scotch oil works. In this oven the

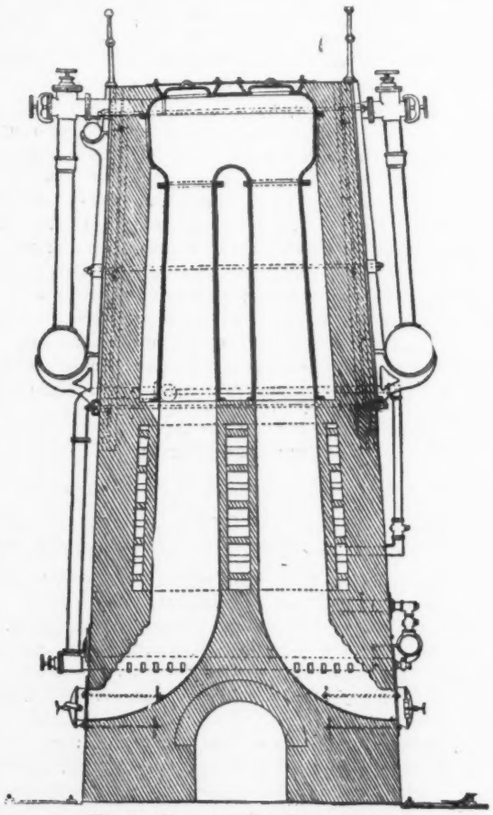


Fig. 5.—Young & Beilby's Pentland Ofen.

additional observation was made that, with an increase in the temperature, the quantity of steam blowout had to be augmented in order to attain to the greatest ammonia production.

(To be Continued.)

[Communicated by "R."]

The Tottering Smoke Stack.

Recently I visited a number of gas manufacturing plants with a view of examining their chimneys and smoke stacks. The annexed illustrations are calculated to give the reader an idea of the condition in which some of the sheet metal stacks were found. A number of the firemen reported it was difficult for them to maintain the proper temperature in the boilers. Some stated that, while an abundance of high grade fuel was used, it was impossible for them to accomplish effective work with the furnaces. In one case I noticed that the mechanical men of the plant had utilized a lot of old railroad rails for grate bars. These old rails were cut to proper length and stretched across a firebrick foundation. The rails were warped and sprung out of order. There were crevices between them through which valuable fuel dropped ere it ignited. Of course the firemen could not get good results. I also found instances in which the smoke stacks of the furnaces were put out of effective service because of the presence of foreign matter. I found cases in which the stacks were lopped out of line so badly that the draft was seriously affected.

Fig. 1 illustrates the condition in which the writer observed the stack of a certain gas plant. The stack had been erected some years before with ¼ inch sheet iron, with laps properly adjusted, drilled and riveted; but the stack received no care. The weatherproof paint, so essential to the stack which is exposed to the rains and dampness year after year, was permitted to wear off and was not replaced with a new coating. Rust accumulated at the joints. Corrosive matter collected about the laps and worked its way into the joining rivets, loosening some of them, so that the weight of the heavy stack caused it to settle at some of the unions, resulting in the stack assuming the warped condition shown in the view. A band was put on and the iron rods extended in four directions to the roof of the building. This band supported the stack for the time being; but the air passage was partly choked. The stack had the appearance of being ready to collapse. Trouble was experienced in maintaining the fires. Fuel was wasted. Ultimately the stack was removed and a new one put up, after which considerable less fuel accomplished greater results with the same firing capacity.

In another plant where they were complaining about the draught of the furnaces, the condition of the stack was as represented at *A*, Fig. 1. An entire joint had worked itself partly free. The rivets had been partly destroyed by the action of corroding rust consuming the metal as the years passed by. Finally the joint was so weakened that the high winds lifted off the part as shown, and it was supported in such way that draught was seriously hindered. No attention was given to the defect, however, until as time passed someone thought it advisable to restore the break. Instead of putting on a new joint the loose one was simply ripped off. Nevertheless, this removed the draught-checking affair and the fire burned well after that, although the stack had been shortened just so much.

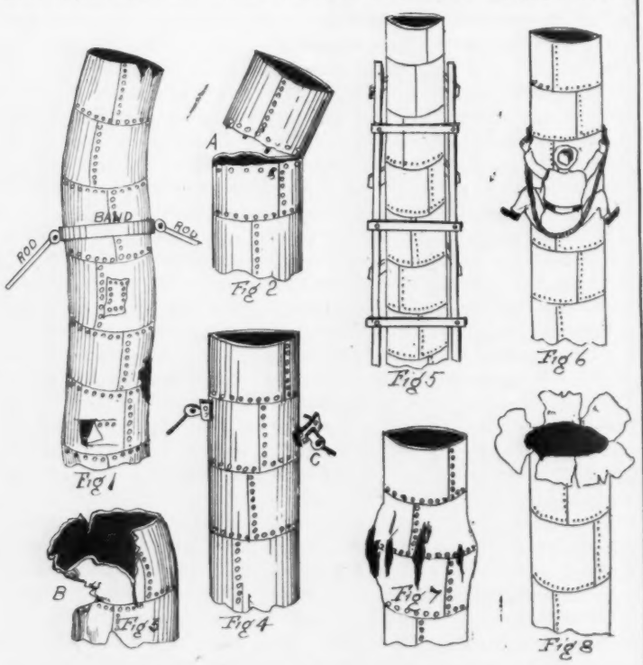
The extreme top of the stack gets the full benefit of everything going, as is known to the engineering fraternity. The upper edge of the stack is usually manifolded and run with a steel ring to add to its stability. Regardless of these precautions, the ridge of the stack begins to weaken and become thinner as years pass, until the condition shown at *B* may be found in some of the old stacks. Often there is a collapse of the thinned metal; sometimes pieces come off. The heat, the effects of the rains and winds, the rust, the corroding, etc., combined serve to demolish the unguarded top works of the metal stack after a dozen or more years have passed. To overcome this trouble, annual inspections of the stack, and recoating of the top with the right kind of paint, stave off the disaster. The paint keeps the dampness off and preserves the metal indefinitely, or as long as you keep the painting going. Hence it is a good idea to let the tramp stack painter have a chance at your metal chimney about once a year, even though he charges you $10 for one day's work.

When you hire the man to do the painting high on your stack, you can get him to replace weakened bolts. Lately one of the chimney and stack painters found a stack about ready to go over due to the breaking of some of the bolts in a guy bracket, as at Fig. 4. The bracket was almost off; but a single bolt held it. However, imperfections and weaknesses of this kind can be remedied before an accident happens.

Of course there are ways to get to the top of the stack yourself. In Fig. 5 is shown one plan. I noticed this in use at a gas works where it was necessary for the workmen to ascend a stack for making repairs. Some 2 by 3-inch pieces 15 feet long, were obtained and arranged upright alongside of the stack. These pieces were further extended by joining other pieces to them as the height was reached. The crosspieces were nailed on at intervals of 4 feet, as shown. The staging thus made proved satisfactory for the workmen in getting to the top of the stack. There are, however, men who can go up one of these stacks with the aid of a rope, used as illustrated in Fig. 6. The strong manila hemp rope is made into a loop of ample size to pass around the stack and leave a margin for the man to work with. The man sits in the loop and uses his arms and knees to do the climbing. He works the rope upward inch by inch. It is slow work but is quicker and cheaper than putting up a staging when some light work is to be done. Perhaps only a minor job is needed on the stack pretty well up on it. It would require some days to erect the staging. In less than an hour the workman can go up with the loop, if he is experienced. Then there are stacks which become choked and which some men try to free with cartridges, just as they try to get choked oil wells to flow once more.

In the case in mind, the stack appeared to be closed up with something. The workmen secured some cartridges and let one of them loose at the top of the stack, hoping to blow out the accumulated matter,

Instead of this the expanding explosion opened the seams of the stack and created new crevices, as in Fig. 7. Of course the stack was ruined at this point, but it was remodelled and saved, however, by putting on new joints where the damage had been done. It is best to go slow with the cartridges; better use the small and light ones first anyway, or until experienced. Your stack is demolished by lightning occasionally. Sometimes the stroke of electrical fluid from the clouds will run down the stack easily and quietly, with only a streak to mark the road. Again, as in this case, the bolt will open up the upper ridge of the stack, as shown in Fig. 8, and you have to erect your staging and put



on some new joints to replace the fractured ones. This occurs at remote intervals and you are annoyed, but after all it is all in the business. Keep your stack open with the soot brushes. Keep the metal protected with paint. Put out a few dollars every year on it. Engage a man to inspect it every season, if necessary. Such men travel about the country inspecting and repairing at moderate prices.

Cooking by Gas.—Is It Injurious to the Meat?

In considering this query the London *Lancet* sometime ago said: The question narrows down to a consideration of the effects which the products of gas combustion, whether they be complete or incomplete, are likely to have upon the meat. We may thus count upon the exposure of the meat to small quantities of such incomplete products of combustion as carbon monoxide, acetylene and sulphurous acid, and to the complete products, carbon dioxide, steam and traces of sulphuric acid. It is well known that during the cooking of meat by whatsoever process the meat loses weight, or, in other words, there is a constant emission of vapor, and, consequently, it can hardly be supposed that absorption can be going on at the same time. But assuming that not to be the case, what effect is the bombardment of small quantities of carbon monoxide, acetylene and sulphurous acid likely to have on meat, and would these effects render the meat less suitable for food? Both carbon monoxide and acetylene form molecular combinations with the coloring matter of the blood, but then at the high temperature of the cooking process it is hardly conceivable that such a combination could take place, besides which a plentiful supply of air would prevent either carbon monoxide or acetylene from being permanently absorbed. The minute quantity of sulphurous acid would tend to bleach the color of the meat, but as a rule no effect of this kind is observed. If sulphuric acid is formed, this, at a high temperature, might possibly char slightly the surface of the joint. All such speculations, however, are strongly discounted by the fact that meat during its cooking is emissive and not absorptive. As to steam and carbonic acid, it is questionable whether they could have any depreciatory chemical action at all. The conclusion seems inevitable, therefore, that any differences that are shown between meat cooked in front of the fire or in an oven next to the fire and meat cooked in a chamber containing gas flames inside must be due entirely to physical and not to chemical causes. In a word, the explanation must lie in the different manner in which the heat is applied in the different circumstances. It should be borne in mind, however, that in cooking by gas the meat is exposed to a rapid current of steam derived from the combustion of the gas, whereas in the range oven the only steam present is that which comes from the meat itself, while in open roasting in front of the fire there is no atmosphere of steam round the joint at all; the air is free to play over its surface, and the cooking is done by radiated heat. We believe the process of open roasting is far superior to that of close roasting; the flavor of the meat so cooked is invariably better, and the tissue itself is generally more tender when it is cooked by roasting, and, consequently, more digestible. We are inclined to put forward the view that the cooking of meat by gas is less satisfactory than cooking by the open roast method, because in the former case the joint is cooked partly by ascending heat currents and partly by steam. According to this view, cooking by gas may be regarded as a hybrid process, that is to say, part boiling or steaming and part roasting. The constant stream of steam over the surface of a joint of meat is calculated to extract some of its flavor and to exert a toughening effect on the tissues of the meat. We do not think, however, that any difference between the effects of gas cooking and cooking by roasting or in the range oven can be regarded in a serious light from a point of view of dietetics. The differences, in our opinion, are due entirely to the different physical conditions under which the meat is cooked, and we may safely exonerate, we think, the gas cooker from any suspicion of poisoning the meat by reason of the escape of unconsumed gaseous products from the gas flame. The process of grilling meat exposes that food to a torrent of incomplete products of combustion compared with what happens in the gas cooker, and yet a grilled chop is very popular, "the taste of the grill" (the sulphurous acid and, perhaps, a little smoke) being held in esteem; but the gases round the chop in this case do not contain anything like the proportion of hot aqueous vapor which is present in the gas cooker.

Waterproofing Concrete and Masonry.

By Edward W. DeKnight, Western Society of Engineers.

(1) No waterproofing, especially for difficult and waterpressure work, should be undertaken when the temperature is below 25° F. Fifty per cent. better work can be done when the weather is warm. In cold weather the felt sheets are difficult to handle, the hot bitumen cement chills and congeals too quickly, especially when it comes in contact with a cold wall, and it is difficult to obtain the perfect cohesion of the different felt layers.

(2) Allow sufficient time, room and accommodations in which to properly apply the materials. The reverse of this rule, however, is the common practice. No matter how conscientious a workman may be, he cannot, for example, do good work on a wall, from the outside, if the excavation is not wide enough from the wall to give him room in which to work, or on the inside of the wall if he has scarcely light or arm room, and is crowded upon by workers in brick, in cement, in stone, in steel, etc.

(3) Design the structure to properly receive waterproofing.

(4) Specify always that the waterproofing shall be done only by experienced and skilled labor. Roofing, for instance, is not waterproofing.

(5) Thoroughly protect the waterproofing during and after application. The average laborer is no respecter of waterproofing, especially an elastic waterproofing, and will walk on same, roll wheelbarrows over it, throw tools, lumber, brick, stones, cement and debris thereon, to its serious damage. After arches are waterproofed, it is a common mistake in placing the fill, not to begin same at the base of the arch but to dump the fill on the crown. The fill thus often breaks through the brick or cement protection on the waterproofing, and tears or strips the waterproofing from the arch surface. It is best to permanently protect waterproofing with a layer of brick or cement mortar.

(6) Inspect waterproofing at all times during application. See that the materials as specified are used, and also that they are themselves up to standard; that the work is done carefully and skilfully, particularly in the out-of-the-way small, difficult places; that the laps are not made 22 inches when they should be 24 inches; that the hot cementing material is applied not one-fourth or one-half, but the entire width of the lap; and that it is applied hot, quickly and thoroughly; that full, clean

and well-protected connections are provided; that the waterproofing is well protected at the end of the day's work; that no work is done except in the presence and by the approval of the special inspector appointed over the work.

(7) Do not depend on guarantees. The speaker has always contended that a waterproofing guarantee is practically worthless. A roofing guarantee is of value, because the clause of and responsibility for leaks can be easily settled. Seldom, however, is there any recovery had under a waterproofing guarantee. Bonding companies are averse to supporting waterproofing guarantees because of the high risk. It will be found, on close analysis, that bonded guarantees do not, in fact, guarantee. Such, for example, is a bonded guarantee reading, that the structure or surface to which the waterproofing is applied, must remain "sound and stable."

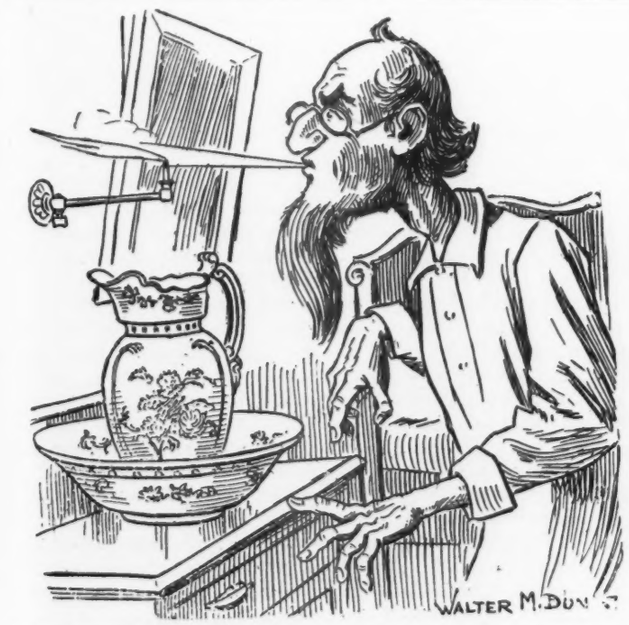
The very purpose of waterproofing is to waterproof the structure or surface in the event of their not remaining "sound and stable." Such a guarantee, of course, means nothing, except that the bonding or other company assumes no risk, but shifts it to the owner of the structure, who himself then guarantees that his structure or wall will not crack or injure the waterproofing. The waterproofing should accommodate itself to the wall, instead of the wall accommodating itself to the waterproofing.

A strong case in point is a recent decision on a waterproofing guaranty by the United States Circuit Court of Appeals, Third Circuit, 144, Federal Report 942. In a contract for the foundation of a building the specifications, after describing the waterproofing materials to be used, stated: "The whole to be made perfectly watertight and guaranteed." On the completion of the foundation it leaked and payment was withheld from the contractor. The contractor contended that he had strictly followed the specifications but was not accountable for the result of the plans. The Court upheld the claim of the contractor.

(8) Do not use a standard specification. Each design must suit the exact conditions, and each specification must exactly suit the design. Using a standard specification results in the customary but very serious mistake of placing the waterproofing details on the contractor. A contractor will apply anything that is specified, and, as a rule, is interested only in getting it applied as quickly as possible. Speed in waterproofing is undesirable and dangerous. The specification as to waterproofing should make the contractor responsible only for the proper application of the materials under the close observation and approval of the engineer.

"And the Blow Almost Killed Father."

A correspondent in Chicago incloses the following sketch which is



self-explanatory. The sender also suggested that "father's" blow was so strong, if continued it could not fail to be exhaustive.

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, Feb. 11th, 1907.

Centennary of Public Lighting by Gas.—A Report on Gas Heating Stoves.

A leading daily newspaper, in its issue dated 29th January, directs attention to the interesting fact that exactly 100 years previously large crowds assembled in Pall Mall (a fashionable West End thoroughfare) to gaze at a row of gas lamps which a certain German, named Winsor, had set up in front of the colonade before Carlton House in honor of George III.'s birthday, and which were practically the first gas lamps seen in the streets of London, although Murdoch had demonstrated the practicability of coal gas some years before. As usual with new departures from the established track, there were scoffers, ignorant and otherwise. Some held that it was a perversion of the ways of Providence that could not fail to bring its own punishment on all who made and all who used the new illuminant. Even so great an authority as Sir Humphrey Davy, the leading scientist of the day, declared that it would be as easy to bring down a bit of the moon as to light London with gas, and asked if the dome of St. Paul's was to be utilized as a gasometer, thus setting off a lead that hampered the progress of the gas industry for many years. Some of the smaller fry in the scientific world proved conclusively that there could not be a light without a wick. Having sketched out the position in 1807, attention is directed to the condition of London streets in 1907 during the hours of darkness and the share taken therein by gas. The scientists of the former period were clever in their way, but poor prophets, for it is gas that has enabled the results so highly eulogized to be secured, and the wick has been relegated to quite a back seat in the matter of artificial lighting. The desire for efficient street lighting, the advantages of which are eloquently set forth in the paragraph under review, is of comparatively recent growth. It was not till the introduction of the incandescent gas burner that a reliable means of flooding our public streets with light at a reasonable cost was available. Previous to that period economy as regarded the public rates was the chief consideration. The principal thoroughfares were indifferently lighted, the back lanes and alleys not at all, and a reduction in the already meager light at midnight was the general custom. About 10 years ago the writer was concerned in the installation of 100-candle incandescent burners in place of 15-candle flat flames, throughout a city, and on the first night of the change happened to meet the chief officer of police. The officer spoke very highly of the alteration on the ground that it would enable his men to recognize any suspected character, and foretold a great decrease of crime, because of the difficulty thus thrown in the way of escaping undetected. The same officer, by the way, was instrumental in opposing a scheme for reducing the lighting at midnight. The views thus expressed in 1897 have become the voice of the public in 1907, and it is recognized that efficient public lighting is indispensable in any town that wishes to keep up with the times.

The Coal Smoke Abatement Society have from time to time directed attention to the use of gas for warming, and some of the statistics that they have gathered contain valuable information for all engaged either in the manufacture or the sale of gas stoves. The *Lancet*, for Nov. 17 last, publishes a report of an experimental inquiry relating to the thermal efficiency of hygienic considerations of this kind of appliance, as elicited by tests conducted upon 25 representative makes of gas stoves or fires. Most of the leading makers appear to have been invited to assist, and Messrs. R. & A. Main, the Planet Company, Richmond Gas Stove Company, Clarke Davis Stove Company, Fletcher Russell, J. Wright & Co., the Cannon Company, and Wilson's, submitted specimen stoves. The tests were conducted in a suite of several similar rooms at the new public offices, which were fairly well ventilated and of large capacity, containing approximately 4,000 cubic feet each. The chimney flues were of similar pattern, 68 feet long, and constructed of 9-inch glazed stoneware pipe, and during the tests the mantle opening was closed entirely with a sheet iron plate, with the exception of a hole to fit the flue pipe of the stove. It will be observed that the flue or chimney was more than twice the length usual under ordinary circumstances, and also that it was not suitable for gas stoves, being evidently intended for coal fires. A flue about 30 feet long and say 5 inches in diameter would be more suited to the class of appliance examined, but as this disadvantage applied to all the stoves tested it does not affect the comparative results. The thermal efficiency was indicated by the heat given to the air that passed through the room as compared

with the quantity of gas used, and the hygienic considerations were based upon examination of the air for carbonic acid or other objectionable products. To determine the efficiency, the calorific value of the gas used was ascertained, and suitable meters were used to indicate the rate of consumption. Thermometers were fixed at the inlet to the rooms, which was a corridor common to the whole set, and at points 6 feet above the floor and 6 inches from the wall opposite the fire, and 18 inches below the ceiling in the center, and at 6 feet from the fire and 6 inches above the floor line, exposed to the radiated heat, and also in the flues. The flue gases were tested for percentage of carbonic acid and the velocity of the upward current was determined by smoke tests. The air in the rooms was examined for carbonic acid, carbonic oxide and impurities capable of oxidizing potassium permanganate. Humidity tests were taken, the absence of smell or otherwise was carefully noted, and the effect on vegetation was illustrated by placing healthy young musk plants in each room at the commencement of a test. Full details of the apparatus used and the methods of procedure are included in the reports, and this portion affords interesting reading for students of gas works' chemistry.

The gas supply pressure was regulated to 12-tenths in each case, and bearing this in mind it would appear that the quantity of gas consumed by gas fires is greater than is usually supposed. It is quite possible that the draught or exhaust created by such long chimneys amounted to 3 or 4-tenths, and this would not be indicated at the pressure gauge if the same was some distance from the fire, but in practice would go to increase the working pressure at the gas outlet. The highest rate of consumption is 66 cubic feet per hour, and several appliances indicated 40 or 50, whereas there is a general impression, probably derived from the makers' catalogues, that it runs in the neighborhood of 20 to 30 cubic feet. The efficiency of a gas stove may be reckoned as the total heat minus that removed by the flue, and it is preferable that as large a proportion as possible should be in the form of radiant heat. In most cases the loss by way of the flue is small, being less than 5 per cent., and it is evident that there is no occasion to study economy at the expense of ventilation. An unpleasant smell, dryness of the air or other unpleasant feature, is more likely to create a prejudice against the stove than an addition of 5 per cent. to the rate of consumption per hour. In most cases there was either no smell, or only a slight odor observable, and this item may have been prejudiced by the long chimneys, as if these were cold at the start it would be a matter of difficulty to get a brisk up current. Some very interesting information was also attained as to the effect of opening the bottom of the flue, in addition to the proper outlet from the fire. A very general idea is that closing up the front of a fireplace with a plate of sheet iron is conducive to economy of gas, but the results recorded do not support this view. In all cases the additional opening increased the velocity of the flue gases, but in no case was there any noticeable effect upon the temperature of the room. The increased up current may possibly create unpleasant draught from the door or windows of the apartment towards the flue, without exercising any useful effect as regards ventilation. It was also observed that although the direction and force of the wind outside the building exercised a marked effect on an empty flue, did not greatly influence the velocity of the current when a stove was in use.

The conclusions arrived at by the operators, in respect to the general question of the utility of gas stoves, are decidedly favorable. They state that a properly arranged gas stove and flue is quite as satisfactory as a coal fire from a hygienic view, that it does not vitiate the air of the room, or produce the abnormal dryness so often credited to gas fires. It will carry off 2,000 to 4,000 cubic feet of air per hour. Gas fires also warm a room quicker than a coal fire, as they start at the moment of lighting in full swing, whereas a coal fire takes time to burn up. There is not the variation represented by the periods of replenishing the coal fire, and the heat produced can be very closely controlled. While gas cannot compete with coal in point of cost if the fire is required for long periods at a stretch, the case is different for short periods, because every time a coal fire is lighted and extinguished there is a waste of fuel. A properly constructed gas fire has the advantage from a hygienic view of more equable temperatures and of the absence of dust and smoke. The examiners consider that all gas stoves should have an independent opening to the chimney, apart from the flue on the top of the fire, not less than 20 inches in area when full open, and provided with an adjustable slide. They also consider there is room for improvement in regard to the material used for the fuel. The fireclay and asbestos at present used in some cases, did not heat equally all over, only the parts actually in the path of the flame showing a bright red heat. A material that will rapidly acquire an incandescent heat is required, and it should be capable of standing continued high temperature without injury. Flues should not be less than 4 inches diameter and should have a regular rise to the chimney, the customary horizontal projection from the back, necessitating an elbow, being an objection. Sudden changes of direction in the flue impede the draught, especially at the first start when all is cold. In concluding, the society acknowledge the courtesy and co-operation displayed by the officials of the Gas Light and Coke Company.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

MR. E. C. FOLSOM, formerly in charge of the Atlantic City (N. J.) railway traction systems, has been appointed General Superintendent of the Saginaw-Bay City (Mich.) Railway and Light Company.

THE Lynn (Mass.) Gas and Electric Company has arranged to put down a 20 inch leading main for the better supply of gas to the town of Saugus.

MR. JAMES T. LYNN, of Detroit, and Mr. A. B. Beadle, of New York, have been appointed by Mayor Thompson as the experts to form the Commission ordered by the Common Council, of Detroit, to examine into and report upon the conditions governing the manufacture and supply of gas to that city by the Detroit City Gas Company. Mayor Thompson must have a fair share of common sense in respects like unto those, for when he desires to find out something about gas he seeks the services of qualified men, in contradistinction, for instance, to the authorities of New York, and districts of Massachusetts. Here and there men of the Marks-Bemis type are the ones who are put on the job.

THE Boonton (N. J.) Gas Light and Improvement Company elected the following Directors at its recent annual meeting: F. Howell, F. E. Morse, W. W. Riddle, J. A. Wardell, E. Kemble, H. Van Duyne, C. J. Kopp, G. E. Miller and P. W. Hammond.

MR. CHARLES K. MCKILLIP has been appointed Superintendent of the Sacramento (Cal.) Gas, Electric and Railway Company, vice Mr. F. E. Fitzpatrick, who had been appointed General Manager of all the properties of the Bay Counties Power Company, of California.

THE authorities of Allegan, Mich., have granted to local capitalists a franchise for the right to there construct and operate a gas plant. The franchise is to run for 30 years.

THE Board of Directors of the Cambridge (Mass.) Gas Light Company, at a special meeting recently held, voted to place on the records the following testimonial to the Company's late Superintendent, the lamented Horace A. Allyn:

"Died on Sunday, January 20, 1907, Horace Augustus Allyn, Superintendent.

"Mr. Allyn was elected Superintendent of the Cambridge Gas Light Company, November 14, 1876, and entered upon his duties on December 1 of the same year. The growth of the business of the Company during his term of 31 years' service has been so remarkable that it may not be out of place to make some note in this connection at this time. A comparison of the reports covering the years 1877 and 1906 shows as follows: 1877—Coal carbonized, 6,263 tons; meters in use, 4,669; gas sold, 62,147,000 feet; price of gas, $3 per 1,000; assets of the Company, $999,653. 1906—Coal carbonized, 34,925 tons; meters in use, 21,228; gas sold, 502,909,000 feet; price of gas, 90 cents per 1,000; assets of the Company, $1,998,096. During all this period of development, Mr. Allyn, although conservative, was not slow to recognize the needs of the Company, was careful to recommend the proper extensions and enlargements of the plant, and ready to adopt new processes and new methods whenever their efficiency and merit had been demonstrated. Even at the time of his death he was engaged in the largest of all the many additions to the works undertaken during his term of office, one calculated to make the plant as well equipped for the business as any in the country. He was untiring in his attention to the many details of his position, and worked early and late, day-in-and-day-out, year by year, to give to the community the service which was expected of him, and at the same time to protect the interests of the Company which employed him. The Directors of the Company, several of whom have been associated with him for many years, recognizing his sterling integrity, and his loyalty and devotion to his work, desire to place on record their high appreciation of the service he has rendered the Company, their deep regret for the loss they have suffered, and their sincere sympathy for his family in the great sorrow that has fallen upon them. By his honesty and ability, by his careful attention and his faithful devotion to the interests of the Company, he earned the commendation of his employers; by his fairness, kindness and consideration, he held the goodwill and effection of his subordinates; by his intelligent and practical methods in his profession he commanded the respect of his brother engineers, and by his courteous and gentlemanly manners he gained the esteem of the community in which he lived."

THE Oregon Gas Manufacturing Company has been incorporated for the purpose of constructing water gas plants, of the type permissible to

the patents granted to Mr. William H. Adams, of this city. The basic patents were issued under dates, respectively, as follows: Oct. 31st, 1906; Jan. 8th and 15th, 1907. The headquarters of the concern are in Portland, Ore., and it is capitalized in $100,000.

MR. R. N. HALL, President of the Sherbrooke (Can.) Gas and Water Company, has, owing to ill health, resigned the position of Minister of Justice, at Ottawa, Canada.

PRESIDENT KENAN, of the Union Gas and Electric Company, has given $8,000 to the Cincinnati Industrial Bureau for the purpose of furthering the latter's aims; of course, the subscription was made on behalf of the Union Gas and Electric Company.

LEST you forget, we again note the fact that Dr. William S. Marks, for some time resident in New York, has been engaged to represent the city of Buffalo, N. Y., in the inquisition that is to be carried on by the State representing the investigation of the Buffalo Gas Company. Fearing that the Doctor would not be fully up to the task, Corporation Counsel Desbecker has retained the services of that other "peripatetic expert," Prof. E. W. Bemis, to assist him in the Buffalo delvings. The Doctor and the Professor; next in line the Undertaker; last, the sepulchre!

"ABOUT a fortnight ago the Malden and Melrose Gas and Electric Companies, of Malden, Mass., gave to their Agents quite an elaborate dinner, which was served in the Parker House, Boston. The proceedings were directed by Mr. A. B. Tenney, General Manager of the named Companies, and when the cigars (and cigarettes) were ignited, Mr. Tenney gave a brief outline of the vast work that had been recently finished by the Company and that which was in course of accomplishing, all going to show how much the systems had been improved and how much more they would be when the work now in progress was finished. Mr. F. C. Sargent, the electrician gave an interesting exhibition of various electric lamps and shades, showing how much more light could be obtained with proper appliances. He also showed them how to pop corn with an electric popper. Mr. H. A. Gedney gave a short talk on the proper use of gas burners and the way to keep them clean. Mr. F. P. Royce, Vice-President of the Companies, then gave an interesting history of the three Companies, that of the Malden Electric Company being of especial interest to Malden people. His talk was illustrated by lantern slides, showing the old conditions and the new. He showed in figures the work done, the taxes paid as compared to years ago and the business done. The Malden Company was the first in the country to install incandescent lamps for street lighting. Since 1900 the Company had spent $350,000 in new plant and machinery and the gross business in that time increased from $132,000 to $230,000. Much the same work is now being done at the gas plant and it would soon be one of the model one's in the State, as the electric plant already was. He instanced the great expense being undergone and with all this there had also been a reduction in rates. General Superintendent Alvin E. Bliss, one of the three original employees of the Company, gave some interesting reminiscences of the old days and the beginnings of a vast enterprise. State Senator C. L. Dean and A. S. Hall, and Assemblymen F. A. Bayard and C. T. Hall also addressed the Agents. Those present numbered 42, and all agree that Manager Bliss comes pretty near to being the right man in the right place.—R. G. M."

PRESIDENT HAMLINK, of the Gas Bench Construction Company of St. Louis, Mo., informs us that the following orders have been put on their books: Four benches for East St. Louis, Ills.; two for Kingston, N. Y.; two for Millville, N. J.; one at Fort Worth, Tex.; one at Valparaiso, Ind.

THE Pueblo (Col.) Gas Company's commercial man recently hit upon a happy idea respecting how to attract the attention of the residents practically to the virtue of gas as an addition to the comforts of the home. On the floor of the recess at the main window of the Company's office on North Main street was placed a small bathtub, alongside of which was a gas water heater, properly connected up. Off-and-on, in-and-out, at many times of the day, either one or two dusky picanninies disported themselves in the tub, thus showing to the passerby how even a negro can be successfully cleaned and kept clean. It is needless to add that the "ad." was the greatest drawing one ever seen in Pueblo.

MR. GEORGE PETTIBONE, Manager of the municipal gas and electric lighting plant at Westfield, Mass., in his annual report respecting the operations thereof, impresses upon the authorities the absolute needs for a storage holder. The estimated cost of the same—Mr. Pettibone recommends a single-lift vessel rated to store 100,000 cubic feet, and arranged for the easy addition of a second lift—is $25,000.

THE proprietors of the Columbus (Ind.) Gas Light and Coke Company have petitioned the authorities for an extension to their existing franchise, which will make its ultimate life 25 years. In consideration therefor the Company offers to put the gas rate at $1 per 1,000 within a period of 10 years, and to pay to the city 1 per cent. per annum on its gross receipts, the payments to date from the time the franchise is extended. There is little doubt that the terms proposed will be ratified.

THE Stone-Webster Electric Company, of Boston, Mass., has secured absolute control of the Baton Rouge (La.) Electric, Gas and Power Company, the properties of which have been merged with the Baton Rouge and New Orleans Railway Company. The latter corporation has been controlled by the Stone-Webster Company for some time.

MR. AND MRS. NORMAN G. KENAN sailed this week for a trip to the West Indies and South American ports. Another pair—and golden pheasants are but plebeians to them—that are on the wing are Mr. and Mrs. Charles H. Dickey, of Baltimore, Md., who sailed from this port, per the "Bermudian," Saturday morning last. May their voyages be as they are themselves—all to the good.

"DEAR JOURNAL: Sorry you were not with General Manager Aldrich and ourselves some evenings ago, when we journeyed in a sleigh with him from the Haven to Mrs. Riland's, where a Riland chicken-and-waffle supper was served and put away; yes, that's it—put away. Everything—yes, everything was out-of-sight.—JAS.-JAY-GUY."

THE Hess syndicate, of Philadelphia, Pa., assert they will have the gas plant for Newport, Pa., in operation by Sept. 1st.

THE people who are so fearful of disaster from gasholders located in thickly populated districts are asked to note that some evenings ago a fire occurred in such a situation in the Riverside section of Paterson, N. J. The circumstances were such as to try the holder to its utmost, but the holder came out of the trouble center almost unscathed, and helped rather than harmed those within the danger zone.

THE New York State Commission of Gas and Electricity has denied the application of the Onondaga Lighting Company for a certificate of authority to transact business and to issue $100,000 capital stock, and that of the Syracuse Lighting Company for consent to increase its capital stock from $4,000,000 to $9,000,000, and to lease its franchises, works, system and properties to the Onondaga Lighting Company for a term of 999 years. The statement sent to the newspapers respecting the decision is virtually as follows: "The Commission disapproved of the lease generally upon policy, but more particularly objecting to a provision permitting semi-annual issue of common stock for betterments and for increasing the ratio of dividends upon all outstanding stock. The Commission believes the capitalization is excessive, because for the past 2 years it has paid a dividend of but 2 per cent. on the common stock and 5 per cent. upon the preferred. To allow the proposed return on the present stack issues of $4,000,000 and the present bonded indebtedness of $5,000,000 as well as the same return on any future issued stock, would prevent any future regulation of the price of gas and electricity, sold by the Syracuse Lighting Company, that did not recognize the outstanding securities as representing the value of the property and the rate of return thereof. Allowing liberally for an increase in population, for a probable decrease in the cost of production and distribution, for increased consumption, as well as rate of consumption, and for other possible favorable factors, the Commission is of the opinion that the contemplated returns upon these securities would impose an excessive burden upon the community, a per capita burden greater than is deemed reasonable or warranted. Not only is the proposed lease objectionable in these respects, but approval of it would in the future foreclose the State in the exercise of certain present and important powers of supervision over those interests."

WE regret to have to chronicle the death of Mr. Frank H. Somerville, who died at his home in Denver, Col., the evening of the 14th ult. Deceased who was born in Roxbury, Mass., January 29th, 1875, became a member of the commercial staff of the Denver Gas and Electric Company in 1903, and served it capably and successfully. Interment was made last week in the Roxbury cemetery. The immediate survivors of his family are his mother, 3 brothers and a sister. He was a very lovable chap, and the services over his remains, as conducted by his fellows in the Denver Company, were beautifully rendered.

MR. B. F. BULLOCK, Superintendent of the Fredericksburg (Va.) City Gas Works, writing under date of the 21st ult., says: "We have completed our first year of operation in our new plant, and our inclines are working beautifully. In 1906 we showed the following percentage gains as compared with the preceding year: Gas sold, 22.6; coke and tar, 11. In addition we cut down the coal carbonized by 14.2 per cent. The gain in gas ranges amounted to 50 per cent., and we are confident of an excellent season in that respect the current year."

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NOTIFICATION RESPECTING ADVERTISING.

Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand any time of Wednesday.

AGENTS:

New York—American News Co., 39 and 41 Chambers St.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegle. 30 Lime Street, London.

MONDAY, MARCH 4, 1907.

The Market for Gas Securities.

Consolidated gas was in more than fair demand last week, and the net result of the bartering was a full gain of 2 per cent. in the bid opening price to-day (Friday), or 139 to 139½. This, remember, is ex-dividend of 1 per cent. Brooklyn Union is steady at 115 to 125. Peoples, of Chicago, shows no variation over the figures of last week. As a 6 per cent. sure dividend payer it certainly looks low at 93½. Massachusetts gas is fairly steady. The whole market shows the effect exerted by the slump in railroad shares, and one could hardly make a mistake in purchasing anything on the gas list. The gas bond market is fairly active, and some bonds look remarkably cheap—Brooklyn Union 1st fives, due 1948, at under 110.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

MARCH 4.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	139	139½
Central Union Gas Co.—				
1st 5's, due 1972, J. & J.	3,000,000	1,000	101	104
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	..	105
Mutual	3,500,000	100	190	225
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	98½	100
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	37	43
1st Mtg. Gold Bds. 5 p.ct.	1,000,000	..	98	104
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	101	103
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	108	111
Con. 5's, due 1945, J. & J.	1,500,000	..	104	110
Standard	5,000,000	100	140	160
Preferred	5,000,000	100	155	175
1st Mtg. 5's, due 1930, M. & N	1,500,000	1,000	104	108
The Brooklyn Union	15,000,000	1,000	115	125
1st Con. 5's, due 1948, M. & N	15,000,000		107	..
Yonkers	999,550	500	130	..
Out-of-Town Companies.				
Bay State	50,000,000	50	¼	⅜
" Income Bonds	2,000,000	1,000	..	75
Binghamton Gas Works	450,000	100	..	65
" 1st Mtg. 5's	500,000	1,000	95	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	9	10
" " Bonds, 5's	5,250,000	1,000	75	80
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	106½
Cincinnati Gas and Electric Co.	29,500,000	100	99½	100
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	90	..
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	..	95
Preferred	3,026,500	100	107½	108
Consumers, Toronto	2,300,000	50	200	204
Consolidated, Baltimore	11,000,000	100	.	90
Mortgage, 6's	3,500,000	..	..	118
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
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Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	..	..	100
Detroit City Gas Co	5,000,000	50	..	50
" Prior Lien 5's	4,618,000	1,000	..	98
Detroit Gas Co., 5's	351,000	1,000	75	80
" Inc. 5's	16,000	100	98½	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	39	40
Fort Wayne	2,000,000	..	..	..
" Bonds	2,000,000	..	55	..
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	..	110	112
Bonds, 5's	10,500,000	..	107½	108¼
Indianapolis	2,000,000	..	60	70
" Bonds, 5's	2,650,000	..	104½	105
Jackson Gas Co	250,000	50	82	..
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	26
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	..	05
Preferred	2,500,000	100	95	110
Bonds	10,000,000	1,000	104	104¼
Lafayette Gas Co., Ind.	1,000,000	100	..	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas & Elec. Co. " 1st Mtg. 6's	250,000	1,000	106	108¾
" 6 per cent. scrip, due 1910	100,000	25	85	87
Massachusetts Gas Companies of Boston	25,000,000	100	64¾	65
Preferred	25,000,000	100	84¾	85
Montreal, Canada	2,000,000	100	218	218¾
Nashville Gas Lt. Co	1,000,000	100	110	..
Newark, N. J., Con. Gas Co.	8,000,000	..	56	58
Bonds, 6's	6,000,000	..	137	138
New Haven	2,000,000	25	200	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	93¼	93⅝
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
" 2d "	2,500,000	1,000	104	..
Rochester Gas & Elec. Co.	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	104½	105¼
San Francisco, Cal.	15,800,000	100	..	..
St. Joseph Gas Co. 1st Mtg. 5's	751,000	1,000	92	..
St. Paul Gas Light Co	1,500,000	100	45	47
1st Mortgage 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	2,465,000	1,000	98¾	..
Syracuse, N. Y.	1,975,000	100	50	55
Bonds	2,047 000	1,000	102	..
Washington, D. C	2,600,000	20	281⅞	285
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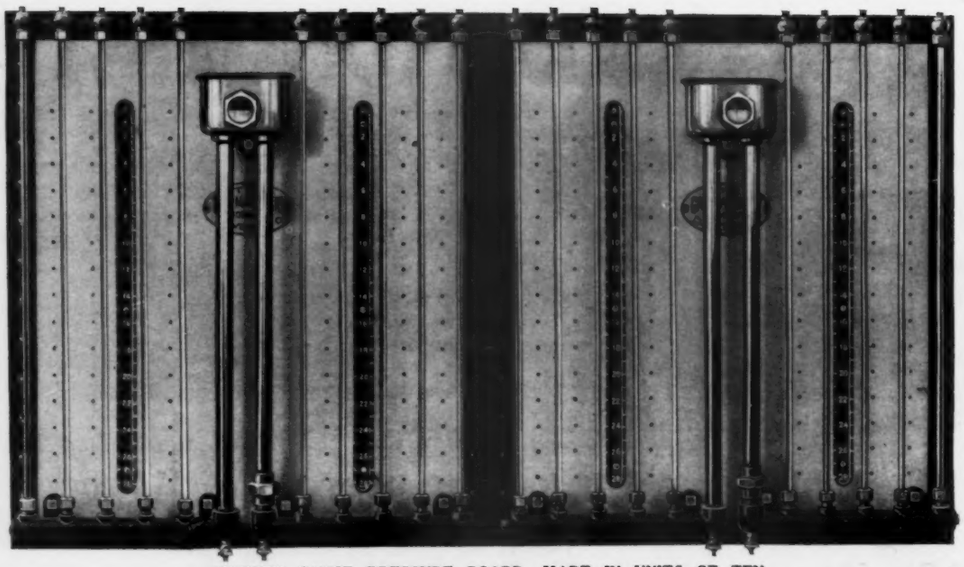


TWENTY GAUGE PRESSURE BOARD, MADE IN UNITS OF TEN.

THE GAS MACHINERY CO.
CLEVELAND, OHIO.

Parker-Russell Mining and Mfg. Co.,

ST. LOUIS, MO.

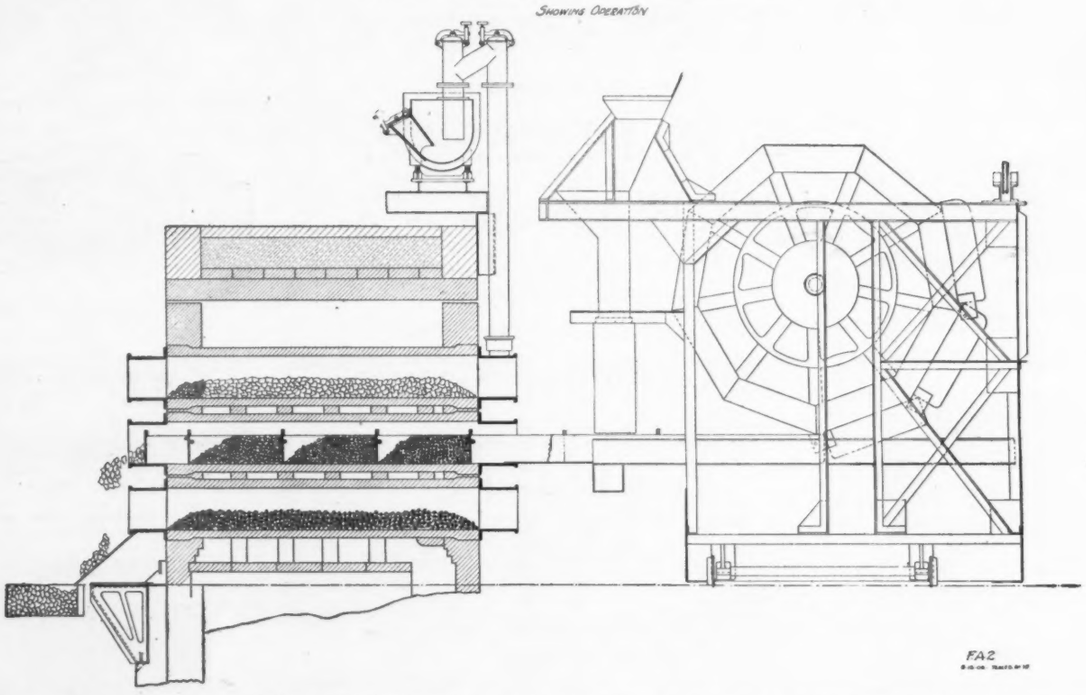
ST. LOUIS OFFICE, 417 Pine Street. | NEW YORK OFFICE, 45 Broadway.

GAS RETORT BENCHES, STOKING MACHINERY, STAND-PIPE CLEANER and STRAIGHT STAND-PIPE SYSTEM.

GAS RETORTS AND FIREBRICK.

We Manufacture Gas Retorts and Settings, Furnace Blocks and Fireclay Tiles of every description.

FIDDES-ALDRIDGE SIMULTANEOUS RETORT DISCHARGING-CHARGER SHOWING OPERATION



Benches.--We erect GAS RETORT BENCHES with Horizontal retorts having closed ends up to 10 feet in length, or Through retorts up to 20 feet in length.

Slopers.--Also, SLOPERS on improved lines for Inclined Retorts.

Stoking Machinery.--Sole Agents for U. S. and Canada for the Fiddes-Aldridge Simultaneous Discharging Charger. The "F. A.," or "One-Stroke" Machine. Cost of Carbonizing reduced to minimum. No Dust. Silent. No Waste of Coal. No Injury to Retorts.

Water Gas Linings.--We make a specialty of WATER GAS BLOCKS, and supply brick of superior grade for checkerwork.

Stand-Pipe Cleaner and Straight Stand-Pipe System.--Agents for the sale of the Stand-Pipe Cleaner and Straight Stand-Pipe System of the United Gas Improvement Company.

Retort Houses and Conveying Machinery.--We also build Retort Houses, Coal and Coke Conveying Machinery. Plans, specifications and estimates cheerfully furnished.

CORRESPONDENCE SOLICITED.

ALL CONTRACTS MADE, AS OF ST. LOUIS.

WHAT UNCLE SAM'S EXPERTS SAY OF BRAY BURNERS.

The United States Government Inspector of Gas,

in an Annual Official Report, has stated: "In particular, was attention given to inspection of **BRAY'S "Special" Slit-Union** and **"Special" Union-Jet Burners.** The "Special" Burners manufactured by **Geo. Bray & Co.** compare favorably with any yet inspected by this office; **they are well made** and no doubt will prove very durable in practical use. The result of test with **BRAY'S Standard Slit-Union was highly satisfactory;** it will yield the maximum candle power obtainable from a cubic foot of gas."

A Postal Brings our Blue Book.

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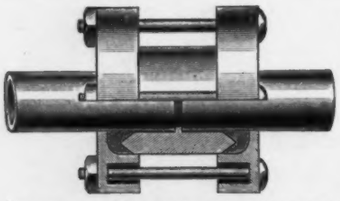
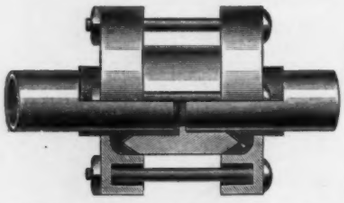
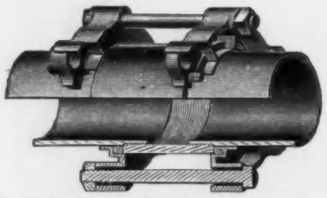
WE MAKE GAS APPLIANCES OF ALL KINDS. SOLE AGENTS FOR THE UNITED STATES AND CANADA.



Regular Coupling, Style 1, for Plain End Wrought Iron Pipe.



Insulating Coupling, Style 5, for Plain End Wrought Iron Pipe,



Clamp, Style 4, for Repairing Leaks on Screw Collar.

Long Sleeve, Style 2, for Mending Broken Lines.

S. R. DRESSER MANUFACTURING CO.,

SUCCESSORS TO

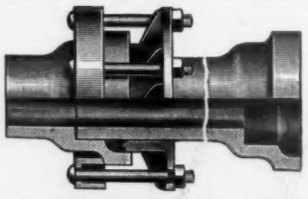
S. R. DRESSER,

BRADFORD, PA., U. S. A.,

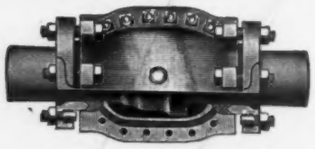
Patentee and Manufacturer of Specialties for Gas and Water Lines,

Pipe Couplings, Sleeves, Clamps, Crosses, Tees and Ells.

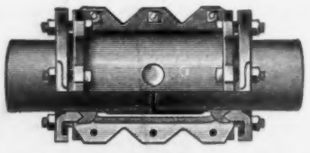
STATE REQUIREMENTS AND SEND FOR CATALOGUE.



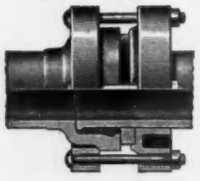
Coupling, Style 9, for Special Style Cast Iron Pipe.



Split Sleeve for Repairing Broken Bell on Cast Iron Pipe.



Split Sleeve for Repairing Broken or Cracked Cast Iron Pipe.



Clamp, Style 4½, for Repairing Leaky Lead or Cement Joints in Cast Iron Pipe.

RICO RICO RICO RICO RICO

We know wherein every one of the twenty-odd imitations differ from the "Ramsdell" Inverted Gas Lamp—the "Rico" brand.

The difference in one or two cases is only slight, but it is just that difference that makes the "Ramsdell" Lamp a practically perfect and highly satisfactory lamp.

That same little difference is what will keep the "Ramsdell" Lamp popular long after the imitators are all forgotten.

It is to the interest of the gas manufacturer to have every customer understand this difference at the start.

RAMSDELL INVERTED GAS LAMP CO., INC.,
530 BROADWAY, NEW YORK.

RICO RICO RICO RICO RICO

H. M. Byllesby & Company

(Incorporated),

GAS ENGINEERS,

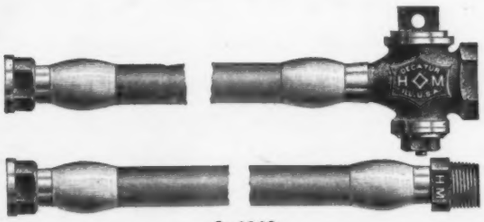
DESIGN, CONSTRUCT AND OPERATE COMPLETE COAL, WATER AND CRUDE OIL GAS PLANTS.

HIGH AND LOW PRESSURE DISTRIBUTING SYSTEMS.

AMERICAN TRUST BUILDING,

CHICAGO.

MUELLER
WIPED JOINT GAS METER CONNECTIONS.



C—1043.

Pipe evenly machine swedged to nearly half the length of the fittings and only big enough to leave no unoccupied space around the fittings. Solder mostly tin and most of it evenly wiped immediately over the joint. Started right and finished right.

THE MARK OF DECATUR H⊘M ILL. U.S.A. MUELLER GOODS
UNCONDITIONAL GUARANTEE

H. MUELLER MFG. CO.,

Decatur, Ill., U. S. A. New York, N. Y., U. S. A.

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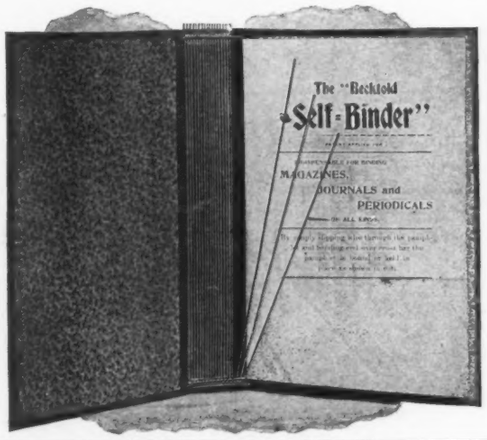
FOR THE
JOURNAL.



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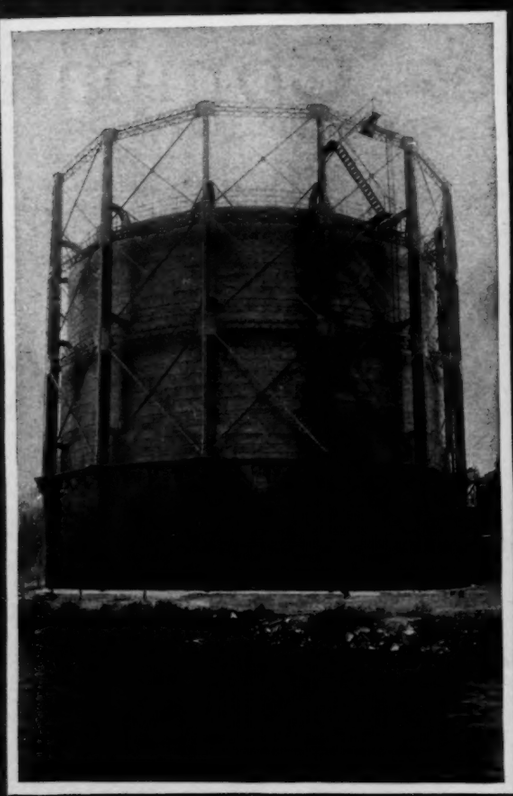
FOR SALE BY

A. M. CALLENDER & CO., - 42 Pine St., New York.



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TRIPLE
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Gas Holders

WITH OR WITHOUT
METAL TANKS

Oil and Water Tanks
Purifier Covers
General Plate Metal Work and
Steel Water Towers

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PROMPTLY FURNISHED ON REQUEST

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BENCH WORK

CHARGING AND DISCHARGING MACHINERY

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PRIMARY AND SECONDARY CONDENSERS FOR FRESH OR SALT WATER

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ROTARY AMMONIA SCRUBBERS

SHAVING SCRUBBERS PURIFIERS STREET GOVERNORS

MAIN OFFICE AND WORKS
BRIDGE & OGDEN STREETS
NEWARK, N.J.
ESTABLISHED 1865

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Ludlow Valve Mfg. Co.,

TROY, N. Y., U. S. A.

Double and Single Gate Valves, ¼" to 72",

—FOR—

Gas, Water, Steam, Oil, Ammonia, Etc.

HOT GAS VALVES A SPECIALTY.

Send for Catalogue.

This cut shows the Hunt Cable Car handling coke (cold) which has been quenched in the Mann chute.

C. W. HUNT CO.,

FOUNDED 1872.

NEW YORK OFFICE: 45 Broadway.
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MANUFACTURERS OF

COAL and COKE HANDLING MACHINERY

AND THEIR APPURTENANCES, SUCH AS VALVES, SCREENS, etc.

Also "Industrial," Automatic and Cable Railways, including cars for unusual conditions.

Bristol's Recording Pressure Gauges

—(ALL RANGES).—

Used the World Over.

Necessary Equipment

Write for Catalogue A.

For Every Gas Plant.

New York: 114 Liberty St.

Chicago: 753 Monadnock Bldg.

The Bristol Co., Waterbury, Conn., U S.A.

ARTHUR E. BOARDMAN, C.E.,

For several years associated with the late CAPTAIN WILLIAM HENRY WHITE,

WILL CONTINUE THE BUSINESS OF

CONSULTING ENGINEER

For Gas, Water and Electric Light Companies, at

No. 41 Wall Street, Room 1707, New York.

TELEPHONE, 5534 BROAD.

ESTABLISHED 1856.

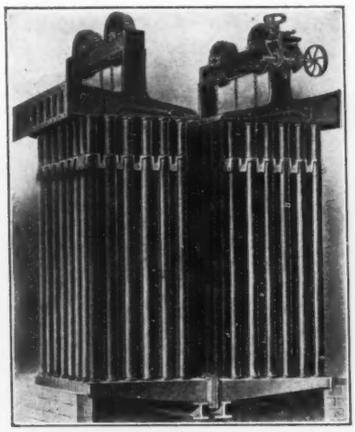
HENRY MAURER & SON,

Manufacturers of

High Grade Firebrick, Blocks, Tiles,

ETC.,

Works: Maurer, N. J. Office: 420 E. 23d St., N. Y. City.



HOW MUCH COAL PER 1,000 CU. FT. OF WATER GAS?

If the process of making water gas were theoretically perfect, only 24 lbs. of coal would be consumed per 1,000 cu. ft. of gas generated. As a matter of fact, the actual figures are between 40 and 48 lbs. per 1,000 cu. ft. It is apparent that there is a waste somewhere, and if you will take the trouble to put a thermometer over the stack valve during the "blowing up" period, you will see where the heat goes to. From one-third to one-half of the heat escapes to the atmosphere, either as sensible heat or latent heat of combustion. If use can be found for this heat a great economy could be effected immediately.

We have found such a use. By means of the Green Air Heater 12 per cent. to 15 per cent. of this heat, or more, can be imparted to the air blown to the generator. This will reduce the time for blowing up and increase the temperature of the generator, so that about the same proportion of coal will be saved.

After the gases have passed through the air heater they are still hot enough to use in a Green Fuel Economizer to heat the boiler-feed water up to the evaporative point. In In this way a quarter of the boiler coal can be saved. In connection with a 6-ft. generator an investment of $3,500 in an Air Heater and an Economizer will save from $2,300 to $2,500 per year. This ought to repay you for the trouble of writing us for further information. Ask for Circular "AG."

THE GREEN FUEL ECONOMIZER CO.,

MATTEAWAN, N. Y.

(Sole builders of the Green Fuel Economizer in this country; we also build Fans and Blowers.)

FOR HOT BATHS,

And for every other Hot Water Need, use the

IMPROVED

HUMPHREY CRESCENT INSTANTANEOUS WATER HEATERS.

Efficient. Compact. Durable. Every Heater Guaranteed.

No. Heaters.	Price.	Gas Supply from Meter.	Heats Gals. per Min. 50° in Temperature.	Height.	Diameter.	Shipping Weight.
Non-Contact.. 2	$40.00	¾ Inch.	3⅛	34⅝ Inches.	12 Inches.	70 Pounds.
Contact..... 6	29.00	¾ "	3	29 "	12 "	65 "
" 8	23.50	1½ "	2½	28¾ "	10¼ "	48 "

These prices include Safety Valves and Unions, one Bent Output Spout. For prices of fittings see our complete catalogue, "The Luxury of a Bath."

We will be glad to quote Discounts.

HUMPHREY CO., · · · Kalamazoo, Mich.

The ONLY manufacturers in the world of a complete line of Instantaneous Water Heaters.

LLOYD'S SUBMERSION WASHERS.

Maximum Efficiency,
Minimum Back Pressure,
Complete Safety.

Western Sales Agent
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WHY DO GAS EXHAUSTERS

AND HIGH PRESSURE GAS PUMPS BUILT BY

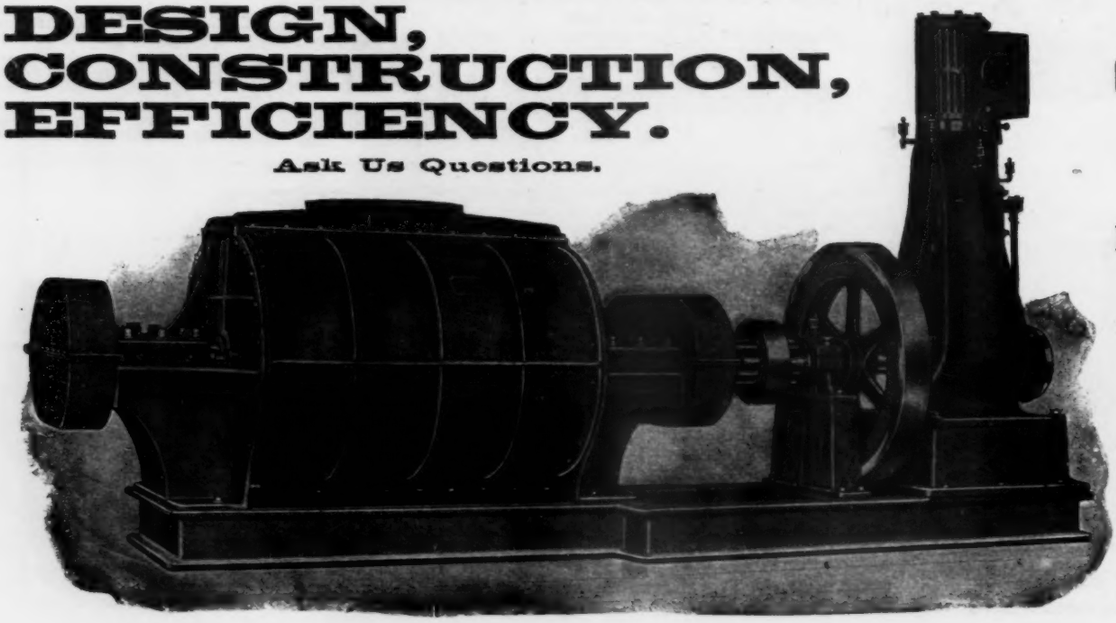
THE CONNERSVILLE BLOWER CO.

Stand so High in the estimation of those using them?

THE ANSWER IS IN THREE WORDS:

DESIGN, CONSTRUCTION, EFFICIENCY.

Ask Us Questions.



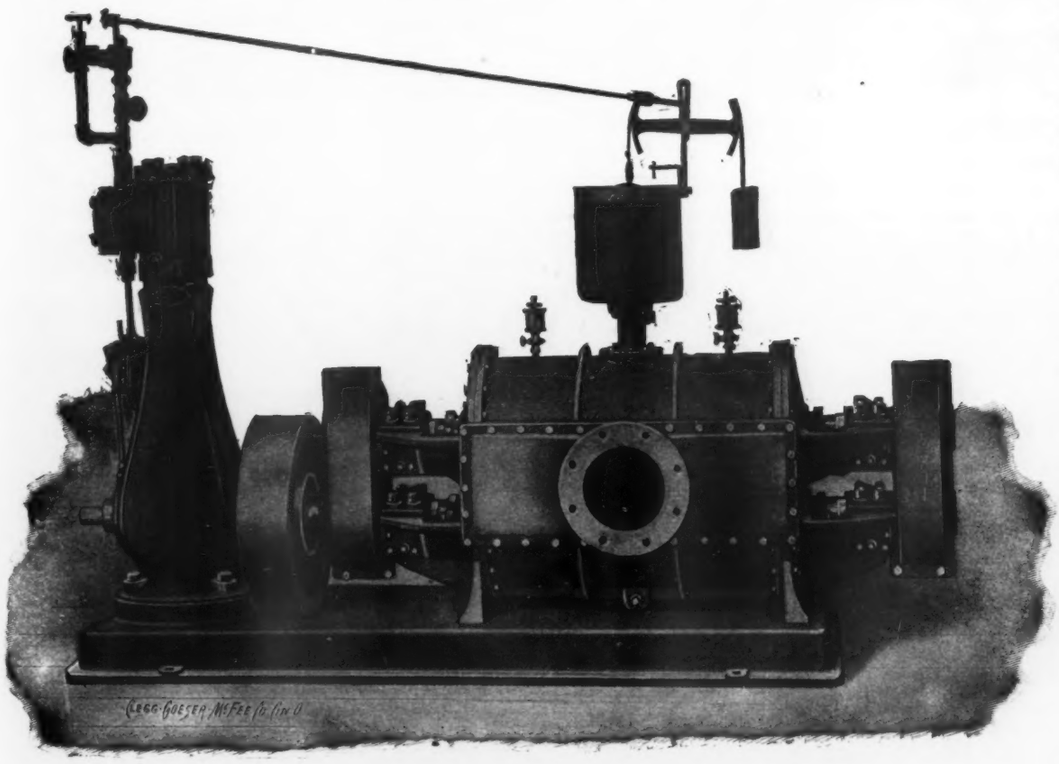
Home Office:
CONNERSVILLE, IND.

Eastern Sales Agent:
HORACE G. COOKE,
95 Liberty Street,
New York City.

Write us about our Improved Stuffing Boxes.

Something Entirely New.

ROOTS' GAS EXHAUSTERS.



Sizes for any required capacity.

Self-oiling, adjustable bronze bearings.

Most perfect and sensitive Governor.

Write for Catalogue.

P. H. & F. M. ROOTS COMPANY,

HOME OFFICE:
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NEW YORK OFFICE:
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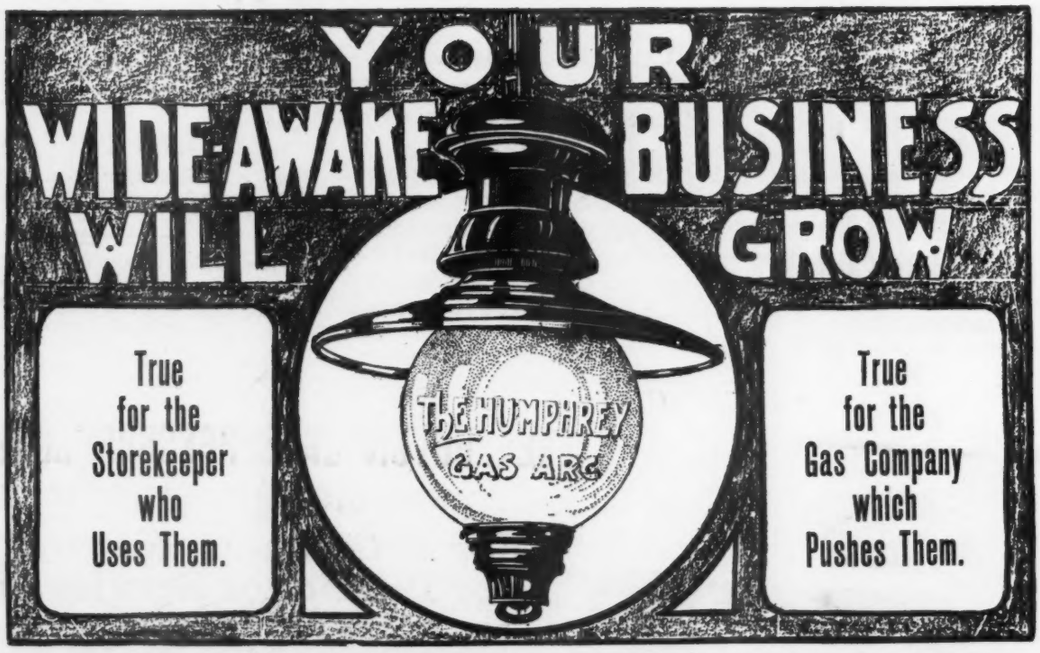

NEW YORK CITY:
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SAN FRANCISCO:
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GENERAL GAS LIGHT CO.,
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CAST IRON PIPE AND SPECIAL CASTINGS

FOR WATER AND GAS.

Also, FLANGE PIPE, LAMP POSTS, Etc.

GAS TAPPING MACHINES

—FOR—

Drilling and Tapping Pipe under Pressure

WITHOUT ANY ESCAPE OF GAS.

They are Strong and Compact.

Size of Combination Drills and Taps ¾ to 4-inch.

Machines Sent to any Gas Company for Thirty Days' Trial.

Send for Circulars.

Geo. Light,
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"THE MINER"

Globe Street and Boulevard Lamps.

Cheapest and Best

THOUSANDS IN USE WITH INCANDESCENT BURNERS.

Send for Catalogues.

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Plans prepared and Estimates furnished at short notice.

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Established 1856. Works at Phillipsburgh, N. J.

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CAST IRON WATER AND GAS PIPE,

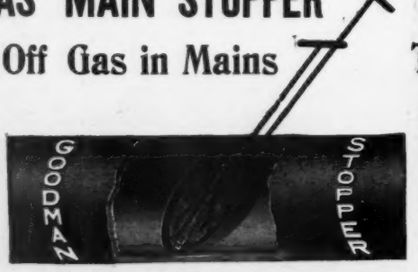
FROM THREE TO FORTY-EIGHT INCHES DIAMETER. ALSO, ALL SIZES OF

Flange Pipe for Sugar House and Mine Work. Branches, Bends, Retorts, etc., etc.

SAFETY GAS MAIN STOPPER COMPANY,

For Shutting Off Gas in Mains

Any size gas main can be shut off in 30 seconds. : : :



Temporarily during alterations and repairs. : : : :

STOPPERS SENT ON TRIAL.

Address: SAFETY GAS MAIN STOPPER CO., 552 E. 135th St., New York City.

Chollar's System of Gas Purification.

THE PURIFIED GAS REVIVES THE FOULED OXIDE.

Practical Handbook on

GAS ENGINES,

With Instructions for Care and Working of the Same,

By G. LIECKFELD, C.E.

Translated with Permission of the Author,
By GEO. M. RICHMOND, M.E.

Price, $1. For Sale by
A. M. CALLENDER & CO.,
No. 42 Pine Street, New York City.

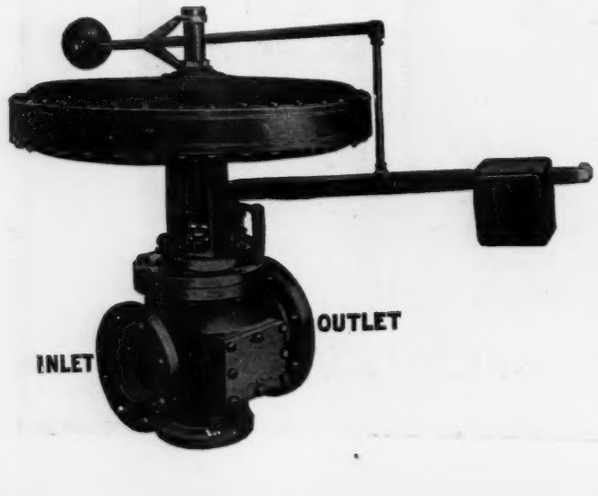
Do You Wish to Know

what size of pipe to use to convey any quantity of gas, any distance, with any loss of pressure and any initial or final pressure? Then use

Cox's Gas Flow Computer,

as it gives this information accurately at sight, without mental effort. No calculations needed. Saves time, money and mistakes.

Price, 6.5 x 8 inches, in cloth case, $2.50.
For sale by
A. M. Callender & Co., 42 Pine St., N. Y.



THE FULTON GAS PRESSURE GOVERNOR,

WITH AUTOMATIC SAFETY CUTOFF.

For Artificial or Natural Gas.
For District or Service Use.

Our DUPLEX SENSITIVE GOVERNOR, with Automatic Cutoff for district service, will reduce high pressure gas to inches of water without variation.

Absolutely safe and reliable. No complicated mechanism to get out of order. More than 20 years' experience with the largest gas companies.

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28-30 PENN AVE., PITTSBURGH, PA.

AMERICAN METER CO.,

NEW YORK, ST. LOUIS, PHILADELPHIA, SAN FRANCISCO, CHICAGO,

Photometrical and Experimental Apparatus.

PUBLIC LIGHTING TABLE.

MARCH, 1907.

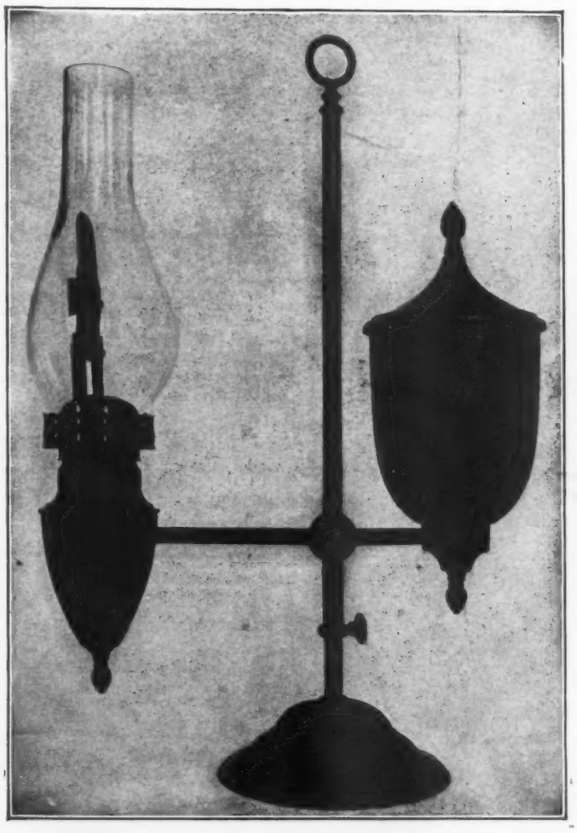
Table No. 1.
FOLLOWING THE MOON.

Day of Week.	Date.	Light.	Extinguish.
Fri.	1	6.20 PM	8.30 PM
Sat.	2	6.20	9.30
Sun.	3	6.30	10.40
Mon.	4	6.30	11.50
Tue.	5	6.30	12.50 AM
Wed.	6	6.30 LQ	2.00
Thu.	7	6.30	3.10
Fri.	8	6.30	4.10
Sat.	9	6.30	5.10
Sun.	10	6.30	5.20
Mon.	11	6.30	5.20
Tue.	12	6.30	5.20
Wed.	13	6.30 NM	5.20
Thu.	14	6.30	5.20
Fri.	15	6.30	5.20
Sat.	16	6.30	5.20
Sun.	17	6.40	5.10
Mon.	18	9.50	5.10
Tue.	19	10.40	5.10
Wed.	20	11.40	5.10
Thu.	21	12.30 AM FQ	5.10
Fri.	22	1.20	5.10
Sat.	23	2.10	5.10
Sun.	24	2.50	4.50
Mon.	25	3.30	4.50
Tue.	26	4.00	4.50
Wed.	27	4.30	4.50
Thu.	28	No L.	No L.
Fri.	29	No L. FM	No L.
Sat.	30	No L.	No L.
Sun.	31	6.50 PM	9.40 PM

TOTAL HOURS DURING 1907.

By Table No. 1.

	Hrs.Min.
January	211.10
February	193.40
March	182.10
April	167.00
May	157.00
June	145.30
July	151.50
August	162.30
September	175.30
October	202.40
November	209.30
December	231.50
Total, yr.	2190.20



THE ELLIOTT KEROSENE STANDARD PHOTOMETER LAMP.

10-Candle Power.

This lamp is a perfect substitute for the 10-candle Pentane Lamp hitherto used, and has the following advantages:

1st. It uses Standard Kerosene Oil (Pratt's Astral Oil or equivalent).

2d. It is remarkably steady. Will burn 24 hours continuously with less than 2 per cent. variation.

3d. It is much less dangerous than Pentane, which is a kind of gasolene.

4th. It is not easily affected by air currents in the photometer room.

5th. Since the lamp may burn continuously, the candle power of gas may be taken at any moment, if necessary. This insures steady illuminating power without waste of carburetting material.

6th. The first cost of the lamp brings it within the reach of even small gas works.

7th. Costs much less to maintain than a Pentane lamp or sperm candles doing the same service.

8th. Is not affected by the weather.

PUBLIC LIGHTING TABLE.

MARCH, 1907.

Table No. 2.
NEW YORK CITY.
ALL NIGHT LIGHTING.

Day of Week.	Date.	Light	Extinguish.
		P. M.	A.M.
Fri.	1	5.30	5.45
Sat.	2	5.30	5.45
Sun.	3	5.30	5.45
Mon.	4	5.30	5.45
Tue.	5	5.40	5.35
Wed.	6	5.40	5.35
Thu.	7	5.40	5.35
Fri.	8	5.40	5.35
Sat.	9	5.40	5.35
Sun.	10	5.40	5.35
Mon.	11	5.40	5.35
Tue.	12	5.50	5.20
Wed.	13	5.50	5.20
Thu.	14	5.50	5.20
Fri.	15	5.50	5.20
Sat.	16	5.50	5.20
Sun.	17	5.50	5.20
Mon.	18	5.50	5.20
Tue.	19	6.00	5.10
Wed.	20	6.00	5.10
Thu.	21	6.00	5.10
Fri.	22	6.00	5.10
Sat.	23	6.00	5.10
Sun.	24	6.00	5.10
Mon.	25	6.00	5.10
Tue.	26	6.10	4.55
Wed.	27	6.10	4.55
Thu.	28	6.10	4.55
Fri.	29	6.10	4.55
Sat.	30	6.10	4.55
Sun.	31	6.10	4.55

TOTAL HOURS DURING 1907.

By Table No. 2.

	Hrs.Min.
January	423.20
February	355.25
March	355.35
April	298.50
May	264.50
June	234.25
July	243.45
August	280.25
September	321.15
October	374.30
November	401.40
December	433.45
Total, yr.	3987.45

GEORGE ORMROD, Pres. & Treas. JOHN D. ORMROD, Supt.
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EMAUS PIPE FOUNDRY.

DONALDSON IRON COMPANY. EMAUS, PA.

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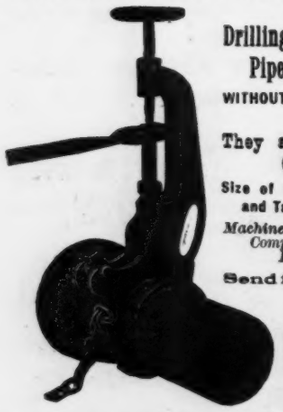
CAST IRON PIPE AND SPECIAL CASTINGS

FOR WATER AND GAS.

Also, FLANGE PIPE, LAMP POSTS, Etc.

GAS TAPPING MACHINES

—FOR—



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WITHOUT ANY ESCAPE OF GAS.

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Size of Combination Drills and Taps ¾ to 4-inch.

Machines Sent to any Gas Company for Thirty Days' Trial.

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Globe Street and Boulevard Lamps.
Cheapest and Best
THOUSANDS IN USE WITH INCANDESCENT BURNERS.
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821-823 Eagle Av., N.Y.

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Plans prepared and Estimates furnished at short notice.
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CAST IRON WATER AND GAS PIPE,

FROM THREE TO FORTY-EIGHT INCHES DIAMETER. ALSO, ALL SIZES OF

Flange Pipe for Sugar House and Mine Work. Branches, Bends, Retorts, etc., etc.

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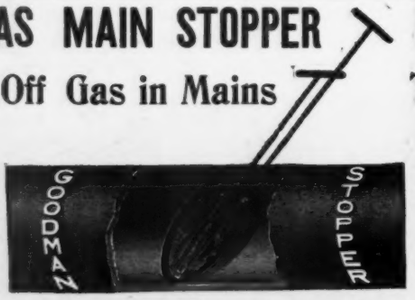
For Shutting Off Gas in Mains

Any size gas main can be shut off in 30 seconds. : : :



Temporarily during alterations and repairs. : : : :

STOPPERS SENT ON TRIAL.

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Chollar's System of Gas Purification.

THE PURIFIED GAS REVIVES THE FOULED OXIDE.

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With Instructions for Care and Working of the Same,
By G. LIECKFELD, C.E.
Translated with Permission of the Author,
By GEO. M. RICHMOND, M.E.
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A. M. CALLENDER & CO.,
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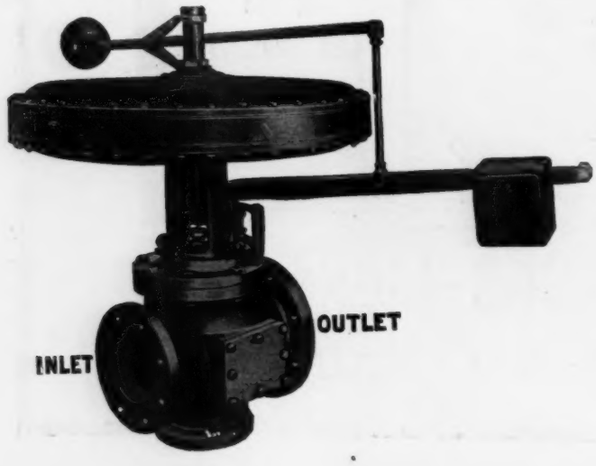
Do You Wish to Know
what size of pipe to use to convey any quantity of gas, any distance, with any loss of pressure and any initial or final pressure? Then use
Cox's Gas Flow Computer,
as it gives this information accurately at sight, without mental effort. No calculations needed. Saves time, money and mistakes.

Price, 6.5 x 8 inches, in cloth case, $2.50.
For sale by
A. M. Callender & Co., 42 Pine St., N. Y.



THE FULTON GAS PRESSURE GOVERNOR,

WITH AUTOMATIC SAFETY CUTOFF.

For Artificial or Natural Gas.
For District or Service Use.

Our DUPLEX SENSITIVE GOVERNOR, with Automatic Cutoff for district service, will reduce high pressure gas to inches of water without variation.

Absolutely safe and reliable. No complicated mechanism to get out of order. More than 20 years' experience with the largest gas companies.

SEND FOR LATEST CATALOG.

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AMERICAN METER CO.,

NEW YORK, ST. LOUIS, PHILADELPHIA, SAN FRANCISCO, CHICAGO,

Photometrical and Experimental Apparatus.

PUBLIC LIGHTING TABLE.

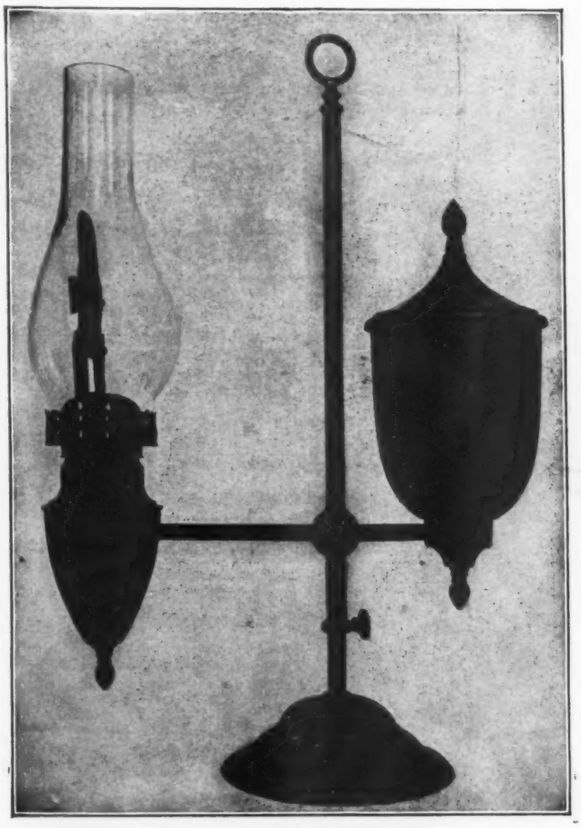
MARCH, 1907.

Day of Week.	Date.	Table No. 1. Following the Moon. Light.	Extinguish.
Fri.	1	6.20 PM	8.30 PM
Sat.	2	6.20	9.30
Sun.	3	6.30	10.40
Mon.	4	6.30	11.50
Tue.	5	6.30	12.50 AM
Wed.	6	6.30 LQ	2.00
Thu.	7	6.30	3.10
Fri.	8	6.30	4.10
Sat.	9	6.30	5.10
Sun.	10	6.30	5.20
Mon.	11	6.30	5.20
Tue.	12	6.30	5.20
Wed.	13	6.30 NM	5.20
Thu.	14	6.30	5.20
Fri.	15	6.30	5.20
Sat.	16	6.30	5.20
Sun.	17	6.40	5.10
Mon.	18	9.50	5.10
Tue.	19	10.40	5.10
Wed.	20	11.40	5.10
Thu.	21	12.30 AM FQ	5.10
Fri.	22	1.20	5.10
Sat.	23	2.10	5.10
Sun.	24	2.50	4.50
Mon.	25	3.30	4.50
Tue.	26	4.00	4.50
Wed.	27	4.30	4.50
Thu.	28	No L.	No L.
Fri	29	No L FM	No L.
Sat.	30	No L.	No L.
Sun.	31	6.50 PM	9.40 PM

TOTAL HOURS DURING 1907.

By Table No. 1.

	Hrs.Min.
January	211.10
February	193.40
March	182.10
April	167.00
May	157.00
June	145.30
July	151.50
August	162.30
September	175.30
October	202.40
November	209.30
December	231.50
Total, yr.	2190.20



THE ELLIOTT KEROSENE STANDARD PHOTOMETER LAMP.

10-Candle Power.

This lamp is a perfect substitute for the 10-candle Pentane Lamp hitherto used, and has the following advantages:

1st. It uses Standard Kerosene Oil (Pratt's Astral Oil or equivalent).

2d. It is remarkably steady. Will burn 24 hours continuously with less than 2 per cent. variation.

3d. It is much less dangerous than Pentane, which is a kind of gasolene.

4th. It is not easily affected by air currents in the photometer room.

5th. Since the lamp may burn continuously, the candle power of gas may be taken at any moment, if necessary. This insures steady illuminating power without waste of carburetting material.

6th. The first cost of the lamp brings it within the reach of even small gas works.

7th. Costs much less to maintain than a Pentane lamp or sperm candles doing the same service.

8th. Is not affected by the weather.

PUBLIC LIGHTING TABLE.

MARCH, 1907.

Day of Week.	Date.	Table No. 2. New York City. All Night Lighting. Light	Extinguish.
		P. M.	A.M.
Fri.	1	5.30	5.45
Sat.	2	5.30	5.45
Sun.	3	5.30	5.45
Mon.	4	5.30	5.45
Tue.	5	5.40	5.35
Wed.	6	5.40	5.35
Thu.	7	5.40	5.35
Fri.	8	5.40	5.35
Sat.	9	5.40	5.35
Sun.	10	5.40	5.35
Mon.	11	5.40	5.35
Tue.	12	5.50	5.20
Wed.	13	5.50	5.20
Thu.	14	5.50	5.20
Fri.	15	5.50	5.20
Sat.	16	5.50	5.20
Sun.	17	5.50	5.20
Mon.	18	5.50	5.20
Tue.	19	6.00	5.10
Wed.	20	6.00	5.10
Thu.	21	6.00	5.10
Fri.	22	6.00	5.10
Sat.	23	6.00	5.10
Sun.	24	6.00	5.10
Mon.	25	6.00	5.10
Tue.	26	6.10	4.55
Wed.	27	6.10	4.55
Thu.	28	6.10	4.55
Fri.	29	6.10	4.55
Sat.	30	6.10	4.55
Sun.	31	6.10	4.55

TOTAL HOURS DURING 1907.

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November	401.40
December	433.45
Total, yr.	3987.45

NEW YORK, 318 West 42d Street. BOSTON, 820 Beacon Building. PHILADELPHIA, Broad and Arch Streets. ST. LOUIS, 712 Roe Building. CHICAGO, 218 La Salle Street. SAN FRANCISCO, 512 Oak Street.

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Controls and Operates the **Welsbach System of Street Lighting.**

Which includes its specially DESIGNED and PATENTED BURNER for PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in 150 Cities and Towns.

By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

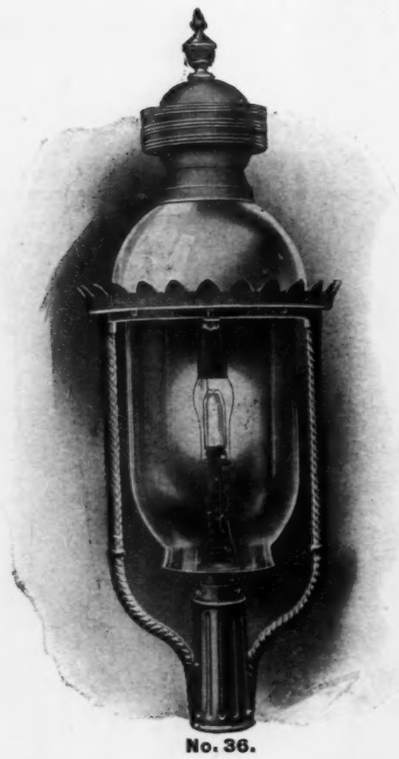
POINTS OF MERIT:

It is { Economical, Attractive, Successful, Up-to-date.

IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others interested in Municipal and Outside Lighting.



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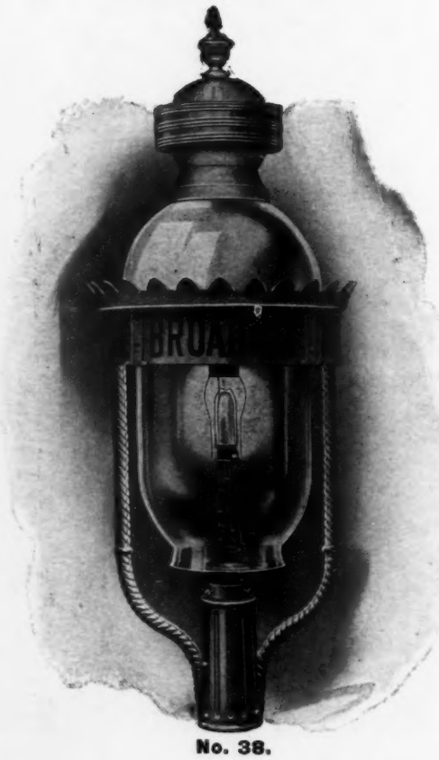

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INVERTED REFLEX TRADE MARK GAS LIGHT

Succeeds and Excels the Electric Light at One-Quarter the Cost.

THE BURNER.

Elegance of Appearance.
Best Possible Material and Workmanship.
Perfect Combustion.
Lowest Gas Consumption.
Highest Candle Power.
Will Fit Any Fixture.
Will Not Flash Back.
Will Not Blacken Mantles.
Will Not Discolor Fixtures.
Will Not Discolor Ceilings.

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Best Welsbach Quality.
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Rich Mellow Light.

THE GLASSWARE.

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Protection from the Falling of Heated Particles.
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GAS WORKS.

LARGEST BUILDERS OF

CARBURETTED WATER GAS PLANT IN THE WORLD.

SOLE BUILDERS

OF THE

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1906 CONTRACTS.

PARTIAL LIST OF PLACES:

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Malden, Mass. (3d contract).
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St. Johnsbury, Vt.
Memphis, Tenn. (2d contract).
Council Bluffs, Ia. (2d contract).
Seattle, Wash. (2d contract).
Philadelphia, Pa.
Waterbury, Conn.
Manchester, N. H.
Allentown, Pa.
Omaha, Neb.
Muskegon, Mich.
Nazareth, Pa. (2d contract).
Lewistown, Pa.
Greenville, Tex.
New York, Cent. Un. (3d contract).
Jefferson City, Mo.
Peekskill, N. Y. (2d contract).
Waterville, Me.
Washington, D. C. (4th contract).
Lawrence, Mass. (3d contract).
Hampton, Va.
Aurora, Ills. (2d contract).
Milwaukee, Wis.
Syracuse, N. Y. (2d contract).
Davenport, Ia.
S. Brooklyn, N. Y. (3d contract).
Delray, Mich.
Albert Lea, Minn. (2d contract).
Leominster, Mass. (2d contract).
Clinton, Mass.

TOTAL SETS INSTALLED IN 1906, ... 41
TOTAL SETS TO DATE, ... 634
TOTAL DAILY CAPACITY, ... 502,555,000 cu. ft.

Tar Extractors for Carburetted Water Gas.
Photometrical Apparatus.
Gas Analysis Apparatus.
Recording Gauges.
Straight Standpipe System for Coal Gas Retorts.
Straight Standpipe Cleaners.

Established 1858. Incorporated 1890.
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H. D. ABERNETHY, Sec.

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Manufacturers of all Material for the Construction of Coal Gas Benches.

HALF AND FULL DEPTH AND FREE FIRING BENCHES,

All styles of which we have in operation, equipped with the BEST of LATEST IMPROVEMENTS, proving our claim for SUPERIOR QUALITY and EFFICIENCY.

INCLINES—We have in SUCCESSFUL OPERATION benches of Inclined Retorts, MANUFACTURED and ERECTED by us.

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Agents for New England States.

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PITTSBURGH, PA.

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"CHRISTY" HIGH GRADE REFRACTORY MATERIAL FOR BENCH SETTINGS, WATER GAS LININGS, ETC.

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GEROULD'S IMPROVED RETORT CEMENT.

A Cement of great value for patching retorts, putting on mouthpieces, making up all bench-work joints, lining blast furnaces and cupolas. This cement is mixed ready for use. Economic and thorough in its work. Fully warranted to stick.

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In Kegs, 100 to 300 " " 6 " "
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DOUBLE and SINGLE DISTRICT STATIONS,

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And Low Pressure Regulators, all of the Dry Diaphragm type.

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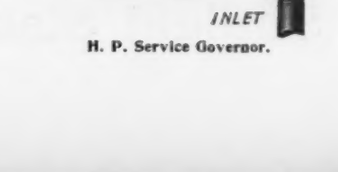

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Four-Scoop and Four-Rake Charging and Discharging Machines are operating in Detroit, Mich., and Cincinnati, Ohio. These are the only machines that will draw or charge simultaneously 3 or 4 retorts (vertically) and handle from 42 to 60 retorts in from 25 to 30 minutes, lid opening and closing and filling of furnaces included.

Hot Coke Conveyor, Quencher and Steam Exhauster, operating in Toronto, Canada, working in water-sealed flue, rollers being protected from heat and grit.

COAL CRUSHERS, CONVEYORS AND BINS. TURNTABLES FOR MACHINES.

Labor-Saving Machines for Handling Coal and Coke from Coal Cars to Coke Yard or Bins. Coke Screening and Measuring Plants a Specialty.

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Contracting Engineer and Builder,

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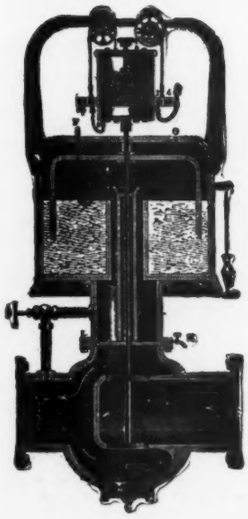

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COAL OR WATER GAS PLANTS,

Automatic, Balance, High Pressure and Service Governors,

Roots Improved Gas Exhausters,

Iron Sponge, Purifying Material, for Gas Purification, Jones Jet Photometers, Pressure Registers, etc.,

INSTALLATION OF SMOKELESS TAR BURNING SYSTEM.

Reinforced Concrete Construction for all Purposes,

Wide Experience in High Pressure Installation and Extension.

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PORT WASHINGTON, WIS.	HOPKINSVILLE, KY.	BOONE, IA.	HUTCHINSON, KAS.
JEFFERSON CITY, MO.	ALBERT LEA, MINN.	AMARILLO, TEX.	DES MOINES, IA.
KOKOMO, IND.	GREENVILLE, TEX.	CUDAHY, WIS.	OMAHA, NEB.
		CRYSTAL CITY, MO.	

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Ocean Westmoreland Gas Coal.

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For Gas Making or
Heavy Steaming.

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NAPHTHALENE SOLVENT.

Cheap and Efficient.

For Use in Works, Mains and Service Pipes. Shipped in 100-gallon Drums.

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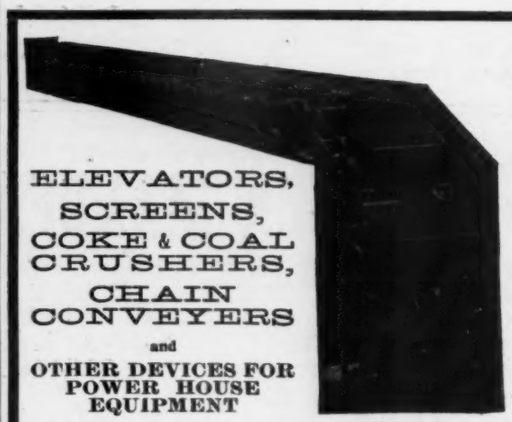
Syracuse, N. Y.



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OTHER DEVICES FOR POWER HOUSE EQUIPMENT

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COAL and ASHES,
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FRED. BREDEL COMPANY,
ENGINEERS AND BUILDERS OF GAS PLANTS.
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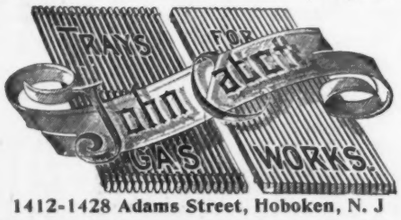

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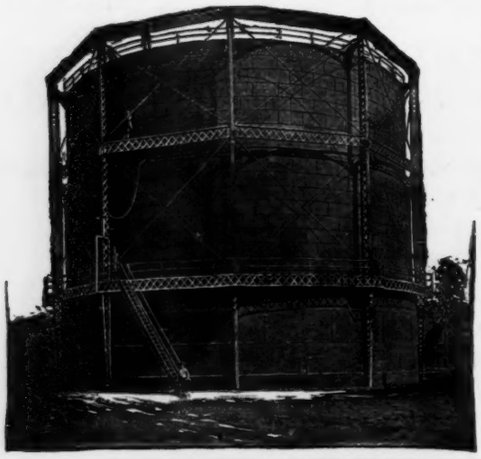

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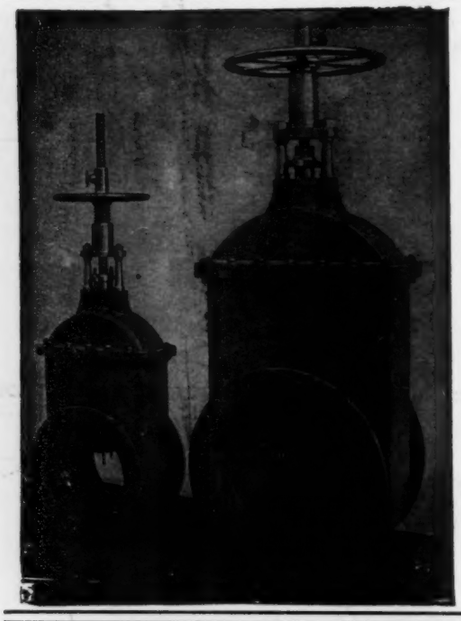

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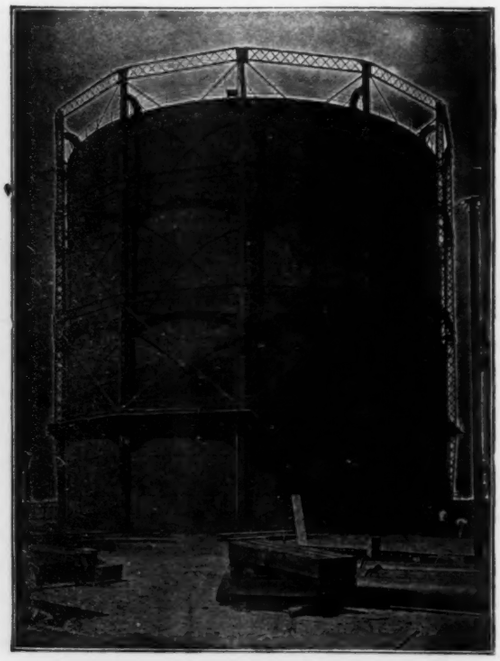

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